DOCUMENT RESUME

ED 402 772 FL 024 330

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TITLE On JALT 95: Curriculum and Evaluation. Proceedings of the JALT International Conference on Language Teaching/Learning (22nd, Nagoya, Japan, November 1995). Section Three: Computers and Language Learning.
PUB DATE Sep 96
NOTE 40p.; For complete document, see FL 024 327.
PUB TYPE Collected Works - Conference Proceedings (021)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Classroom Techniques; *Computer Assisted Instruction; *Computer Networks; *Computer Software; Computer Software Development; Educational Strategies; English (Second Language); Foreign Countries; Higher Education; Language Skills; Learning Laboratories; *Learning Strategies; *Multimedia Instruction; Second Language Instruction; *Second Languages; Skill Development; Teaching Methods

ABSTRACT

Texts of conference papers and summaries of colloquia on computers and second language learning are presented, including: "Computers, Language Learning, and the Four Skills" (summary of a session with Steve McGuire, Albert Dudley, Patricia Thornton, Paul Jaquith, Jay Lundelius, Steve Tripp); "Creating Your Own Software--The Easy Way" (Steve McGuire, Marion M. Flaman); "Multimedia for EFL Learners: Implications for Teaching and Learning" (L. M. Dryden); "The Effects of Learning Strategies in a CALL Laboratory: A Report from Tokyo Kogei University" (Yuka Shigemitsu, Hiroshi Tanabe); "An Adjunct Model in the Computer Classroom" (Katharine Isbell); "Using Computer Networks To Facilitate Communication: Network Projects at Chubu" (Tadashi Shiozawa, Hiromi Imamura, Stephen Briss, Shuji Ozeki); and "CALL: Its Scope and Limits" (Frank Berberich). Individual papers contain references. (MSE)

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Section Three

Computers and Language Learning

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Computers, Language Learning, and the Four Skills

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In 1993 the CALL National Special Interest Group (N-SIG), in cooperation with the Nagoya Chapter of JALT and Kinjo University, sponsored a conference on using computers to teach composition. We felt at the time that teachers in Japan would be most likely to get started using computer assisted language learning (CALL) by teaching writing, and the proceedings of that conference (Kluge, et al., 1994) show the broad range of computer-based activities teachers were doing even then. The reports in this current paper show how teachers are expanding their horizons to teach all language skills using CALL.

Speaking

Albert Dudley discusses how computers can be used in the conversation classroom to help students develop communicative skills.

Research on the use of computers to promote conversation between students has centered on the use of text-based and simulation programs. CALL studies have performed discourse analyses of transcripts of student interactions using a coding scheme developed by Long, Adams, and Castaños(1976) and later adapted and modified by Piper (1986). Researchers have found that the software and tasks brought about a mixed quality and quantity of discourse.

The reason for this variation was felt to be a result of the software's objectives since text-based programs were not necessarily aimed at fostering conversation but rather to help the students' grammatical and lexical ability. Text-based programs such as *Article, Gapmaster, Choice Master, Crossword Challenge, Pinpoint, Clozemaster,* and *Copywrite* are based on tasks whose ultimate goals are realized through multiple-choice, gap-filling, hangman-style word guessing, text reconstruction, and crossword puzzles activities.

These software programs were originally developed for single users. Conversation was brought about by placing two or three students in front of one computer and asking them to solve a problem together. However, Piper (1986) termed this style of conversation "spin off" and did not consider it to be meaningful discourse.

The result of studies that quantified such "spin off" reported little group cooperation and more individualistic traits in the learners (Abraham & Liou, 1991; Levy & Hinckfuss, 1990; Piper, 1986). This was described as a "self access" mode (Piper, 1986, p. 194) because students did not need to rely on other students to find the solutions—they would in many instances find the answers independently either by looking at the computer screen or by using their own language knowledge.

Simulations, on the other hand, showed more potential for use of computers in the conversation classroom. Three studies have shown the potential for the use of simulation programs. Research using a simulation program called *Kingdom* (Jones, 1986; Murillo, 1991) produced the best results when students were given different roles to play, and as Murillo states, "an instructor can start with a simple game and create an interactive and communicative environment for students to operate in" (p. 21). Other simulation programs also were deemed valuable to students' interaction; research using programs such as *Lemonade Stand* (Abraham & Liou, 1991) and *Who Killed Sam Rupert* (Dudley, 1995) have also reported favorable results.

Kingdom and *Lemonade Stand* have one key feature in common: they require the student(s) to make decisions, whether it be how to run a kingdom— i.e. how much wheat to sow and land to plow—or how much lemonade to prepare on a foggy day and what price per glass is competitive to make a profit. These studies found that not only did the students converse with each other, but they also cooperated as a team.

Who Killed Sam Rupert (Gilligan, 1992) is an interactive murder mystery with video, animation, and sound. There are videos of interrogations of suspects and a great number of clues to decipher in order to find out "who done it." This study found that the students worked together in order to reconstruct what they had just heard separately, then tried to apply this knowledge to the mystery of who killed Sam Rupert.

The quality of discourse shows promise. Many instances of confirmation checks, clarification requests, and comprehension checks were found, but most importantly many instances of repairs were found in the students' discourse.

One more avenue of research is the use of information gap exercises on the computer. The assumption is that if more communication is required then a greater quantity and quality of interaction will be observed (Doughty & Pica 1986; Varonis & Gass 1985). One setup to encourage communication is to turn the monitors away from the students. I have done this with a paint program and a commercial software package by Broderbund called *Spelunx*. No data was collected using the paint program but my general observations and the students' reactions seem favorable.

In May of 1995, Paul Lewis and I began a joint research project to quantify the conversations between students using *Spelunx*. Based on my classroom experimentation with information gaps (paint programs, *Spelunx*, and *Cosmic Osmo*) from the previous year, and Lewis' theoretical paper on information gap exercises with computers (Lewis, 1994), we hypothesized that meaningful discourse would develop and be beneficial to the students' interlanguage development.

Although *Spelunx* may be labeled merely a navigational task in which students travel through tunnels, thereby limiting the quality of discourse, preliminary findings reveal that the quantity and quality of the discourse does resemble that of simulation programs. The data clearly shows instances of repairs on the part of the students, yet no instances of comprehension checks have been coded. It appears that this is due to the fact that the software is purely graphical in nature: no vocabulary or spoken words are given to the students by the program.

In summary, simulation programs, if implemented carefully, and the use of information gap exercises hold promising benefits for the communicative syllabus in the computer classroom.

Listening

Patricia Thornton looks at how computers can be used for developing listening skills.

This article will provide an overview of some of the relevant ideas and research studies. There is little research in this area due to the fairly recent widespread availability of CD-ROM and internal digitalized speech. So, the research is just beginning and the use of computers in this area is evolving. In order to understand the issues involved we must first look at listening comprehension theory, and then apply it to the computer environment.

In the 1980's the emphasis in teaching

listening comprehension shifted from bottom-up processing to top-down processing. In bottom-up processing, students focus on sounds, words, and grammatical structures while listening. In top-down processing, students predict before listening and work on getting the gist of what was heard using background knowledge and other contextual information. This is very similar to the schema theory in reading. More recently, listening theorists have proposed that top-down and bottom-up processes interact and that listeners can compensate for their inadequacies with one type of processing by using information from the other.

Much of the current methodology related to listening is based, in part, on our understanding of how native speakers comprehend. In fact, research suggests that there are similarities between L1 and L2 listeners' comprehension processes (Conrad, 1985; Voss, 1984; Cook, 1973). The differences, often a matter of degree rather than type, are important to our understanding of the L2's problems in listening comprehension.

One fact we know from L1 research is that native speakers, when processing sentences, understand and immediately discard from memory the systemic parts such as specific grammatical structure, and store only the propositional content, or meaning (Clark, 1977). Native speakers are able to do this because their use and understanding of systemic knowledge is automatic. They have internalized the rules and meanings attached to those rules so that they are used in comprehension almost unconsciously. For the L2 speaker, the degree to which they can use the systemic knowledge automatically will vary greatly (Dornic, 1979).

Current trends in textbooks and listening courses tend to be toward top-down processing, especially at intermediate and advanced levels. Several listening texts used in universities in Japan were analyzed, and all used a top-down approach. If recent theories are right, and students need both top-down and bottom-up processing, then this focus on schema-based approaches will leave the student inadequately prepared for full comprehension. They will not develop the form to such an extent that its use becomes automatic. In addition, some studies suggest that learners below a certain threshold of language proficiency are unable to activate their top-down processing skills (Clarke, 1979, 1980). On the other hand, earlier research in listening comprehension showed that a bottom-up approach alone is also ineffective. Focusing on form at the expense of constructing associative links leads to incomplete understanding and difficulty in retention. Some studies have shown that the use of schemata can actually compensate for deficiencies in bottom-up processing (Adams, 1982; Cummins 1980).

As educators, we are challenged to find a way to provide practice in both processes. The realities of classes in Japan are few contact hours and segmented courses. It is in this position that I believe computers can help us achieve our goals. Let's consider the strengths of today's microcomputers. They can:

- provide comprehensible input
- provide endless repetition
- be interactive
- give immediate feedback
- combine different kinds of media: visual, text, auditory
- allow the amount and kind of information to be controlled and altered

Considering these strengths, it seems the computer can very effectively handle the training of bottom-up processing. If classes and texts focus on schema-based approaches, work in computer labs can offer the systemic processing that students need to gain skills to become automatic in their understanding and use of grammar and other elements of form.

The research in this area is minimal, but there are a few early studies. Hubbard (1995) of Stanford University used teacher-made listening materials on Hypercard. The materials were sentence-level processing activities. He was investigating students' perceptions of the computer and materials. The results were positive. Students acknowledged the value of the computer activities, and half of them recommended additional computer activities for future courses. Of course, this study deals only with affective factors.

Despain (1995) of North Carolina State University compared traditional listening labs with computer labs. This study had two parts. In Part 1, his results showed that attitudes were more positive toward computerized versions of the activities. In Part 2, data was collected on the amount of time used in each environment. Results showed that students tend to repeat activities more often using computerized listening comprehension exercises, compared with the lab manual and cassette of traditional labs.

Neither of these studies is conclusive nor complete. I hope to see much more data in the future. As a language teacher, I believe that computers can provide better input and more

interesting and varied formats than traditional language labs, and that students will use them more effectively, thus increasing the time and attention given to listening comprehension activities that focus on systemic elements.

What software is now available? There are four kinds of software in listening: word and sentence-level drills, conversations and drills embedded in tutorial programs, pronunciation drills, and longer discourse in simulations or stories that were not designed for EFL learners. Many of these programs give 1-3 sentence utterances and then ask students to respond in a variety of ways. Most give instant feedback, and allow students the option of hearing the utterance as many times as needed by simply clicking a button on the screen. Graphics are often included to increase contextual information.

There are also other possible uses of the computer in listening. The computer could be a stimulus that promotes conversation, integrating speaking and listening comprehension skills. This could involve the use of authoring software or problem-solving activities. Group activities with simulations or information software could generate both listening and speaking opportunities.

In conclusion, the computer seems to be a good tool for practicing bottom-up listening strategies. Inherent in its nature is the ability to produce many and varied short utterances, allow students to interact and respond, and give immediate feedback to help students learn about their own listening skills. We might even say that one thing the computer can be is an enhanced listening lab. Its multimedia ability improves the kind of input, and the technology enables students to have more control over their learning. Early research seems to indicate that students enjoy the computer and thus spend more time on task. The use of the computer for task-based, communicative learning that involves the integrated use of listening skills is also possible, but research data is not yet available in this area. Hopefully more and better data will be forthcoming in the near future.

Reading

Paul Jaquith provides guidelines to use in looking for a good reading program.

A Case for Teaching Reading

In the hoopla following the communicative revolution in language teaching, instruction in reading has dropped through the cracks in many language programs. Yet needs analyses show that for the vast majority of students it remains the most important of the four skills. The teacher who provides his or her students with better access to written English is providing them with a valuable skill indeed.

The decision to use the computer to teach reading is a bold one, and needs careful thought and preparation on the part of the teacher. To date, I know of no programs that I would advocate simply turning students loose under the pretext of "teaching" them how to read, though there are a number of programs that provide students with practice in certain areas. The vast majority of "reading programs" are nothing more than textbook exercises put on the computer, and are far inferior to their paper and pencil equivalents. Others are more explorations in what we *can* do with the computer than what we should be doing. Thus any approach taken to teach reading with the computer should be undertaken with an understanding of the important principles underlying the reading process, and should be pedagogically defensible. Moreover, teachers should proceed with the understanding that good intentions are not enough, and that students can be taught in a way that makes it nearly impossible for them to learn how to read.

Second Language Reading Theory

Second language reading theories have drawn heavily on first language models and research. Those interested in a deeper understanding of the history and issues involved should read Barnett (1989) or Funnell and Stuart (1995) for accessible and balanced overviews. Those interested in something more biased and dogmatic should read Smith (1994).

Two areas where second language reading theory has made particularly notable advances are in schema theory and reading strategies. Schema theory focuses on two distinct areas: content schemata and formal schemata. Both are important for reading instruction. Content schemata refers to the student's background knowledge. This includes specific content knowledge, such as knowledge of chemistry, biology, or physics, and general knowledge of how the world works, which may be heavily influenced by culture. Formal schemata refers to knowledge of text structure and rhetorical organization. Just a little reading in these areas can help generate a tremendous number of ideas for teachers interested in developing or adapting computer programs for reading. For example, Jones and Fortescue recommend using a flexible program called Storyboard to help students develop an awareness of different kinds of rhetorical structure. Research shows both that

certain rhetorical structures and patterns are problematic for second language learners, and that explicit training in recognizing these patterns helps students in their reading. (Barnett, 1989)

Reading strategies help students to learn *how* to read, and perhaps more importantly how not to read. Teaching reading strategies to Japanese students may be particularly important because of the way they learn to read in their own language. Research shows that readers are unable to take in as much at one glance when the writing system is vertical rather than horizontal. Thus Japanese students may have developed reading skills that are oriented more toward the sentence level. (Rayner & Pollatsek, 1989)

Bernhardt's Constructivist Model (discussed in Barnett, 1989) offers a visual representation of how different components of cognition interact in the reading process. The six components are 1) prior knowledge, 2) phonemic/graphemic features, 3) word recognition, 4) syntactic feature recognition, 5) intratextual perceptions, and 6) metacognition. These are particularly useful to teachers selecting or designing computer programs to help students with their reading. For example, there are a number of programs commercially available that help students with letter recognition and in developing phonological awareness, both of which are highly correlated with successful learners in the beginning stages. Flexible word recognition programs also abound. These programs take advantage of the infinite patience of the computer.

Computers

Jones and Fortescue (1987) place CALL reading programs into three general groups: incidental reading, reading comprehension, and text manipulation. Incidental reading programs are those where reading is required to successfully complete an activity but is not the focus of the activity. One might call them reading incentive programs. These would include games, mazes and simulations. Reading comprehension programs follow the more traditional Q&A format found in any reading text book. The vast majority of these can be done better using paper and pencil. They include in this group the horrible speed reading programs, which they actually advocate. In these programs the text gradually disappears, as if someone were pulling down a curtain. The idea here is that students will have a strong incentive for reading faster and more efficiently and will there by graduate to faster speeds. Rubbish! Text manipulation programs are also called text mutilation programs. These include cloze-building programs, which are great for testing and for preparing students for standardized tests, and various programs that scramble words, sentences, paragraphs, and texts. These will be of use depending on how the teacher decides to exploit them.

What follows is a brief check list for teachers thinking about using a computer program for teaching reading.

- What reading skill is the program designed to teach?
- Is the program significantly better than its paper equivalent?
- Can the student successfully complete the task without doing the reading?
- What reading strategies are necessary to complete the task?
- Will the effects on your student's reading ability be positive or negative?
- Will students like it?
- What is the language level?

Writing (Part 1)

Teaching writing is still the foremost means of using CALL in Japan. In the first of two sections on writing, Jay Lundelius looks at using computers for peer critiquing.

Technology has made possible a new level of peer critiquing that is generating a lot of excitement in writing classrooms. Basically, peer critiquing involves having students look at each other's writing and offer comments on how to improve it. But now students are able to engage in writing, revising, and critiquing each other's work while typing on their computers, resulting in more active involvement with the writing process.

Peer critiquing is a valuable way to get students to interact more with their writing; they engage in a critiquing process based on feedback from their fellow students. One advantage to having students critiquing their peers' writing is that peers may be regarded as sympathetic with what a student is trying to say and the difficulties faced in trying to say it. Accordingly, peer critiquers are viewed as collaborators rather than as judges. Another advantage is that students recognize peer revisers as "non-experts." Paradoxically, this may cause the writer to consider *more* carefully the suggestions and criticisms that are made. Since teachers are so often viewed as experts whose judgments are almost inarguably correct, students do not so much interact with their teachers' criticism as

submit to it. However, when students get advice from other students, they recognize that the criticism might well be invalid. As a result, the writers are motivated to consider peer criticism more carefully in order to see if it is well-founded.

Increasingly, schools are networking their computers. The term "network" means that all of the computers are connected to a central computer, through which each of the classroom computers can send and receive information to others on the network. With networked computers, students are able to engage in on-line, synchronous peer critiquing; that is, they can send and receive comments about each other's writing while each is engaged in the process of writing. But beyond the networking hardware, teachers should carefully consider the software that they will use with it. Online peer critiquing can become a management nightmare if students save their files to the wrong disk, use incorrect file names, or accidentally delete files. The chief advantage to using software designed specifically for peer critiquing is that it simplifies the gathering and distribution of individual student texts. Various companies have come up with software specifically for on-line peer critiquing. The one we use at Chinese University is called the *Daedalus Integrated Writing Environment*—sometimes known as DIWE ("dee-wee"), sometimes simply known as "Daedalus." With Daedalus (and other programs like it, such as *CompuTeach*), it is much easier for students to send and receive, as well as to save, store, and retrieve files than it is with current standard system software such as *Novell* or *Appleshare*.

In our Daedalus classrooms, a student writes text, either self-generated or in response to programmed questions. When the writer is satisfied with what's been written, he or she sends the text to what might be called a "billboard," at which point, it appears on every student's screen. The other students may respond to that text or ignore it. Each student can work at his or her own speed. Students who are slow at typing, or who simply prefer to spend more time revising before displaying their work, may take as long as they wish, ignoring comments on the billboard until they feel inclined to engage in the discussion. Comments can be sent back and forth publicly or privately. A student's comments can also be sent under a pseudonym; this may encourage students to be more open in their remarks. (If this feature is abused—if an anonymous writer's comments become irrelevant or destructive to the work at hand—this feature can be turned off so that all comments are attributed.) Occasionally, students may involve others in the discussion, asking about someone else's comments: "She says she's not sure how my examples prove my point. Does anyone else see how?"

As students become more aware of how their writing looks to others, they become more engaged with revising for clarity. As students learn to read more critically and to identify deficiencies and points of confusion in other students' writings, they will become more skilled at identifying such problems in their own writing. With online synchronous critiquing among peers, writing becomes an active process of communicating ideas.

Writing (Part 2)

The World Wide Web (WWW) is opening exciting ways to teach ESL. Steve Tripp takes a step back to provide a framework with which to look at all kinds of learning and specifically writing and then offers the WWW as a way to apply that framework.

The axes of a skills matrix are closed/open, and discrete/continuous. Closed skills refer to those which embody a "correct" procedure; open skills have no one "correct" form. For example, setting the time on a digital watch, a closed skill, has a defined procedure which, if followed, normally guarantees success. On the other hand, a game such as chess, although having closed components, has no set of moves which guarantee success. Chess playing, like most complex activities, is an open skill.

Discrete skills may be thought of as skills which are under no time constraints. Such procedures may be performed slowly with interruptions and still achieve success. An example of a discrete skill is programming a VCR.

In contrast, continuous skills are skills performed under a time constraint. The time constraint is a result of the fact that these skills involve reacting to a continuously changing situation which is at least partly out of the control of the actor. These skills often involve continuous motion, such as swimming or dancing. In addition to such physical skills, many business skills, like negotiating or interviewing, are also continuous.

By combining the two axes, one can produce a 2x2 skills matrix. One important instructional difference between open and closed skills is the kinds of examples that the students are exposed to. Since closed skills have a "correct" form, the instructor will expose the students to that form. Students can practice by mimicking the correct

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performance and, very often, simple right-or-wrong feedback will suffice because students can check their performance against the correct model. Many grammar rules are like this.

With open skills there is no "correct" form. What should the instructor use for examples? When we listen to the introspections of highly skilled professionals we often hear them referring to the people who influenced them. Musicians, painters, and architects typically concede the importance of being exposed to "masters" or "masterpieces" early in their careers. Art students are exposed to great art in our museums. Architects study Greek and Roman buildings as well as modern masterpieces. Traditionally, those who aspire to professional competence do so by exposing themselves to the best the profession has to offer. For complex discrete skills, such as architecture or painting, they study the *products* of the masters. Those who aspire to continuous skills, such as acting or singing, study the *performances* of the masters.

Complex language performance is either open-discrete or open-continuous behavior. Writing is open-discrete and conversation is open-continuous. What is necessary to master the open-discrete skill of writing in a foreign language?

To answer this question we need a theory of the learning of cognitive skills. Anderson (1983, 1993) makes a distinction between declarative and procedural knowledge. Declarative knowledge consist of chunks. Chunks may be *propositions, strings*, or *images*. *Proceduralization* and *composition* are the process whereby declarative knowledge is translated into a form which allows automatic application. Proceduralization creates *productions*, which are the basic units of skilled behavior (procedural knowledge).

There are several important differences between declarative and procedural knowledge. Declarative learning is abrupt and direct. Procedural learning is gradual and inductive. Forgetting is slow for procedural knowledge, but quick for declarative knowledge. The learning of skills requires exposure to examples and practice.

Because skills (procedural knowledge) are acquired inductively, students must be exposed to examples. Under this analysis, a serious flaw with many writing courses is that students do not have access to sufficient examples of the kind of writing they are being asked to produce.

The World Wide Web (WWW) provides an elegant solution to this problem. In addition, to the many original sources already available for reference, a teacher can easily load examples onto a server and make them available to the students. These reference sources can be enhanced with hypertext mark-ups which call the students' attention to important features or give explanations of aspects which may be unclear at first.

When writing in the native language one has intuitions about the appropriateness or inappropriateness of certain words or phrases. By allowing students to query text-bases, they can obtain contextualized information about English usage. An example of this for French is working at the University of Chicago (URL http://www.ncsa.uiuc.aedu/SDG/IT94/ Proceedings/Educ/ lieberman/lieberman.html). Part of this project allows students to see how the verb, *finir*, for example, is actually used by retrieving a large number of authentic examples

When we are learning foreign languages, we often need to use expressions that we haven't mastered yet. Writing students should have access to spelling, style, and grammar rules in a convenient way. These can be assembled as WWW documents or they could be part of a rules database which could be accessed through a WWW forms page.

The main mechanism by which students turn knowledge into skills is practice. Writing consists of both closed and open skills. Practice in closed discrete skills can be easily put on-line. Drills of various types with randomization can be part of a WWW forms page by using *cgis* to access authentic or canned problems. Since the area of practice and the range of examples as well as the difficulty level can be controlled by the student, individualized writing practice can be made available locally or globally.

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Creating Your Own Software—The Easy Way

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Probably the reader is familiar with the following scenario: A teacher at a small school has finally finagled permission to use the school's computer lab for English classes. However, since English wasn't considered in the setup of the lab (It's mainly for design or computer majors), there isn't much software available other than word processing software which might at best be used for composition classes. The teacher would like to use the lab for English communication classes, but there isn't much of a budget yet for software, and besides it will take time for a budget request to make it through the system (assuming it ever does).

In this paper we will mainly discuss two authoring programs which would meet the needs of teachers in the above or similar situations: *Libra* and *HyperGASP*. These two relatively inexpensive programs were designed by language educators specifically for language education. The programs were created to take advantage of the power of authoring software while remaining easy for teachers to use; teachers who generally are not programmers and don't have the time to learn programming. In presenting these programs we will review some of the concepts involved in authoring language lessons and how these two packages fit the needs of a variety of situations.

Why Use Computers at All?

Regarding using computers and authoring software, teachers often ask, "Why use computers at all? Why not do it the old fashioned way? Aren't you just computerizing the textbook?" Or they may have seen the many software programs which obviously are not based on sound pedagogical theory and wonder what the fuss is all about. Answering these questions is beyond the scope of this paper, but a brief reply will help set the stage for our discussion of authoring software.

It is true that many of the functions of a computer program like *Libra*, which is geared mainly towards using a laserdisc player with a computer, could be duplicated by a teacher playing relevant parts using a remote control, but this misses the main benefits of using the computer. With a computer the students can work individually at their own pace and receive immediate feedback on their progress, unlike the above whole-class, teacher-fronted activity. For example, the computer program can replay relevant portions of a video if the students miss a question or can provide supplemental help such as a text or an audio segment. Students can review as many times as they need to as the computer never gets bored and never gets annoyed at their progress. By having students use computers, teachers can often get more information about individual students than they can in a large classroom.

The other advantage of authoring software even over prepackaged programs is it allows teachers to create their own materials with their own focus. So, if a teacher has a video he or she would like to use, the programs make it easier to pull individual frames or short segments out of a video and incorporate it into an authoring program and ask questions or ask students to do activities based on what they saw.

Computers are not merely tools that teachers can add to their repertoire which may include

video, audio, text, or computers. There are studies that have shown that students learn at least as much in computer classes as in classes without computers. Although it will change as more and more students are exposed to computers in high school or at home, it is still true that there is an additional motivational factor in using computers, especially in Japan where knowledge about computers is seen as a good skill to have in an increasingly competitive job market. Also, having computers available offers one more way of matching students' preferred learning styles.

The Software: Commercial/Shareware

As the number of schools with computer labs has increased, so has the number of software packages specifically for learning language. However there are a number of reasons why a teacher might not want to use "ready made" packages. One reason is that many of these packages are "turn-key" software which means the teacher has limited or no control over the content. Because of this, a teacher might need to buy a number of software packages in order to have software to teach all the skills desired. There is educational shareware available, for which the teacher pays only if the software meets his/her needs but as noncommercial software the quality varies from better than commercial packages to poor. Again, the teacher still may not have control over the content.

Authoring Software

There are a number of authoring packages available for both Mac and IBM platforms ranging from *HyperCard*, a general purpose package, to *MacroMedia Director*, an expensive, high-powered package with myriads of features. All of these authoring packages enable programmers to more quickly and easily create programs which previously took 20 to 30 hours for each minute of interaction with programs like *BASIC*. However, there is still a very steep learning curve even for the lowest-level authoring programs.

Additionally, none of these packages were created with teachers in mind. Although there are add-ons (called "stacks") available for *HyperCard*, for example, there has been no single authoring system available for teachers with the features they need most built in.

To respond to this need a number of inexpensive, easy-to-use packages designed specifically for teachers in mind have become available, including *Libra* and *HyperGASP*. These packages are comparatively inexpensive (from $65 a copy to $500 for a site license for *HyperGASP*, for example) and were designed to include the types of tasks teachers need, such as multiple choice questions, true/false questions, *CLOZE* (for *HyperGASP*) and the ability to use a laserdisc player (both *Libra* and *HyperGASP*). While *HyperCard* is required for the author of programs, only the player is required for the student machines (although if the teacher wants students to be able to design their own educational software using these two packages, the full version of *HyperCard* would be required).

Using an Authoring Program

Using an authoring system, a teacher can create a CALL unit without learning anything about programming computers. All the teacher needs to be able to do is to think about how lessons should be presented to the students and select an authoring system that will be able to make such a lesson.

Libra

Libra is an authoring system that focuses on developing listening comprehension skills. *Libra* consists of preconstructed templates that enable teachers to create sophisticated multimedia lessons easily. By using *Libra*, teachers can create interactive videodisc lessons, as well as lessons that incorporate *QuickTime*™movies, graphics, and digitized sound by simply selecting options in the preconstructed templates. The whole process is very straightforward. The teacher clicks on the icon for the feature to be used, and then types in information in response to the prompts given by *Libra*. The preconstructed templates which the teacher will be working with consist of basic expository displays, question formats (multiple choice questions, checklist questions, binary checklist questions, and icon-sorting questions), and a variety of student help displays (*More Information*, *Closer Look*, *Videodisc Scripts*, and *Dictionary*). By mixing and matching these features, teachers can create complete instructional packages tailored to their students' needs.

HyperGASP

HyperGASP works much the same way as *Libra*, and in fact a module to integrate laserdisc players into the lesson is also available. Additionally, *HyperGASP* offers some options built in to the main program, some of which *Libra* provides as an external option, such as the ability to create Cloze exercises, and True/False questions. *HyperGASP* also includes templates writing teachers would be interested in, such as essay response cards (much as the writing program *Success with Writing*) and clustering diagrams to use in brainstorming (the text in the

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clusters can be set to automatically load into a new page for editing).

Both programs allow the finished program to be output as plain *HyperCard* stacks which can then be modified with *HyperCard*. This way teachers interested in writing their own *HyperCard* programs can learn how a particular effect was done, and teachers more skilled in programming can "tweak" the outputted program to do even more. *HyperGASP* allows this process to be repeated over and over, that is, the *HyperGASP* "front end" help facility can be stripped away leaving only a *HyperCard* stack just as with *Libra*, but *HyperGASP* allows the "front end" to be reinstalled on a stack created with *HyperGASP* or with any *HyperCard* stack, whereas *Libra* does not allow outputted programs to be reinputted once converted into *HyperCard*. All this means is that teachers using *Libra* should take care to only output the program into *HyperCard* when they're finished modifying it, and/or should keep a copy in *Libra* format which they can modify later.

Beyond the different features provided, both programs are similarly easy to use. *Libra* has a listening focus, and is geared best for use with a laserdisc player, but really both programs overall allow teachers to create similar authoring programs. *HyperGASP* offers more visible options from the menu bars, but the icons in *Libra*'s tool bars are much more intuitive than *HyperGASP*'s and therefore much easier to use.

Both of these programs are easy to use, and neither require much knowledge about *HyperCard* beyond some simple concepts. *HyperCard* uses a "card" metaphor, meaning that all the activities are presented on cards similar to the 5" x 8" cards we're all familiar with. On these cards the programmer can place fields which present information in the form of text or graphics or allow the student or user to add text themselves. The programmer can control the order in which the user goes through the cards or the programmer can provide buttons which the students can click on which allows the user to decide the order he or she would like to go through a program (with limits set by the teacher/programmer, of course). It would be helpful but not essential to learn about HyperCard, and there are a number of very good books available.

Application

In the simple program based on *Libra* the authors used in their presentation at JALT95, we presented a very short lesson based on a laserdisc of a story by Beatrice Potter. In the sample lesson, the students were asked to view a short segment and answer questions to show how much of the clip they remembered by clicking on binary questions (i.e., "Did the children climb a wall or did they climb a tree?"), by clicking on a box for each expression they heard in the video, and answering multiple choice questions ("Why is Mother upset?"). For each answer we either provided a replay of the video or text feedback on the correctness of their responses. This sample lesson, short as it was, would have taken several hours of programming using even *HyperCard*, but because *Libra* is geared primarily for the functions desired by teachers, the program itself only took about an hour once we had decided the approach we wanted to take and the direction we wanted the lesson to go.

Neither of the presenters feels that the computer can currently carry the entire work of a lesson. We both see it as one more tool in the teacher's repertoire. In fact, few schools could afford to have a laserdisc player connected to every computer, and in many cases there may be two to three students sharing one computer, or there may even only be one laserdisc player and a couple computers for an entire class. This is not a problem, since in that case the computer would only be one piece of a jigsawed lesson. Perhaps one group might be watching a video while another is reading a magazine and another is using *Libra*.

One final advantage the above programs have over "mainstream" programs is that the creators of these programs are still accessible to users. Both *HyperGASP* and *Libra* have e-mail addresses and Web sites, and *Libra* allows those with fast connections to the Internet to download a full-featured copy for review.

Conclusion

In this paper we have provided a brief introduction to the concepts and problems involved for teachers who want to create lessons using computer labs. We have presented necessarily brief looks at *Libra* and *HyperGASP*, two programs written expressly for teachers who want to write computer-based lessons. Unfortunately, describing the programs on paper doesn't do them justice. Fortunately, they are very inexpensive and we encourage teachers to contact the companies for themselves.

Resources/References

Libra

Single use $50 (one set of manuals)
Five authoring stations, $100 (one set of manuals)
Ten authoring stations, $150 (three sets of

manuals)
Fifteen authoring stations, $200 (three sets of manuals)
Twenty authoring stations, $250 (four sets of manuals)
Additional sets of manuals $25

Eighty-Twenty Software
Division of Media Services
Southwest Texas State University
601 University Drive
San Marcos, Texas 78666-4616
Phone: 512-245-2319/Fax: 512-245-3168
Internet: MF03@academia.swt.edu
WWW: http://www.libra.swt.edu/

HyperGASP
One copy $65
12 copies, $200,
30 copies, $300,
Site licence, $500
District licence, $1,000

Caliban Mindwear
6590 Camino Carreta
Carpinteria, CA 93013
805-684-7765/ 805-684-3025
e-mail: CalibanMW@aol.com

Multimedia for EFL Learners: Implications for Teaching and Learning

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Multimedia offers students technical help in their language-learning, meaning-making, and self-expression. Multimedia is, in effect, an array of tools for teachers and students to use in designing their collective future. This article will examine some of the possibilities as well as the limits of multimedia in the language classroom. It will also consider the ways that multimedia—as part of the digital revolution—alters the nature of literacy and affects all aspects of teaching and learning. Because many terms associated with multimedia are not generally understood, some definitions may help clarify the discussion.

• *Multimedia:* This ubiquitous buzzword is frequently overstated and often misunderstood. It is also redundant—multi and media are both plural—but its currency is so wide that we are probably stuck with it. Multimedia, as the word suggests, draws upon more than one media source. It represents the computer-assisted linking of text with non-print elements—sound, graphics, animation, and video—as seen in many CD-ROM discs and, increasingly, in the World Wide Web on the Internet. Multimedia is more than a combination of computers and video; it is a "high-bandwidth" source in the sense that a

great deal of information, in many modes, is available at once (Moore, Myers, & Burton, 1994, p. 30). Perhaps even more significantly, as Debloois (1982, p. 33) contends, multimedia is "an entirely new media" with characteristics greater than the sum of its parts.

Interactivity is the essence of multimedia. Learners control the sequence and even the content of their learning. As Gleason (1991) observes, multimedia not only allows learners to become involved but actually demands their involvement. Multimedia engages learners by its intrinsic ability to provide them with an environment that supports the full range of learning styles, the "multiple intelligences" proposed by Gardner and Hatch (1989)—linguistic, visual, logical/mathematical, auditory, musical, kinesthetic, interpersonal and intrapersonal. In effect, as Moore, Myers, and Burton observe, multimedia allows users to "see, hear, and do," enabling them to draw upon their greatest strengths:

> Through this mix of presentation techniques, interactive multimedia can appeal to learners who prefer to receive information by reading, those who learn best through hearing, and those who prefer hands-on environments. (Moore, Myers, & Burton, 1994, p. 30)

• *Hypertext:* One of the sources of multimedia is the concept of hypertext, theorized in a 1945 essay by Vannevar Bush, professor of engineering at the Massachusetts Institute of Technology and director of the Office of Scientific Research and Development under Franklin D. Roosevelt. Foreseeing the need to manage the exponential growth of knowledge in this century, Bush proposed what he called the "memex," a machine that was never built but was nonetheless highly influential on subsequent thinking about hypertext. Essentially, the "memex" was a device that would imitate the human mind's ability to branch, link, and retrieve information (Bush, 1945, pp. 101-108). It was a "mechanical writing and reading machine that would allow users to map trails within and between documents; these trails could be for personal use or shared with other readers" (Johnson-Eilola, 1994, p. 200).

In the 1960s, such hypertext pioneers as Douglas Englebart and Theodor (Ted) Nelson pursued Bush's ideas of browsing and linking, and, as a consequence, brought multimedia forward. Englebart developed the mouse, which has since become indispensable in personal computing, and the idea of a "view filter" that allowed a user to scan a database quickly for information (Sharp, 1994, Englebart & Hooper, 1988). Ted Nelson coined the term "hypertext" in 1965 to describe non-linear or non-sequential writing (Nelson, 1987). He subsequently created the software *Xanadu*, which permitted a user to connect text and other forms of information electronically (Nelson, 1987).

In hypertext, all forms of data are interconnected so as to enable users to browse through topics of interest in no predetermined order and make their own links between information. As December and Randall (1994) observe, hypertext denotes "text linked across a potentially unlimited number of information sources." A link takes a user to another document, which, in turn, contains links to other documents, (and so forth). With the proper software, these documents can be accessed via the Internet on any hypertext-capable computer located anywhere in the world (December & Randall, 1994, p. 1023). Thus the early work of Englebart and Nelson in the 1960s has led to the current state in which hypertext provides the organizing principle of electronic books, computerized glossaries, and, most recently, the World Wide Web–a hypertext-based resource recovery tool that is gaining dominance on the Internet.

• *Hypermedia:* Ted Nelson also coined this term. While closely related to hypertext, hypermedia emphasizes nontextual media (Nelson, 1987). In hypermedia, computers serve as tools for communicating ideas by allowing users—in the jargon of the field—to input, manipulate, and output graphics, video, sound, and text. A computer is the central processor of information that might come from a video camera, a laser disc player, a VCR, a CD-ROM player, a video and/or audio digitizer, a scanner, even a musical keyboard (Sharp, 1994). Some of the professional hypermedia software tools for manipulating such data include *Macromedia Director* and *Adobe Premiere*. For general educational purposes, there can be found, among others, Claris Corporation's *HyperCard* and Roger Wagner Publishing Company's *HyperStudio*.

Multimedia in EFL Classes

Many teachers are experimenting with multimedia, trying to harness its intrinsic ability to engage students and make them active participants in their learning. The current writer has worked with multimedia in English language and literature classes for almost eight years—with native speakers and ESL students in California from 1988 to 1994, and more recently with EFL students in Japan for the past two years. (I recount my California experiences in Dryden, 1994, pp. 282-304.) Like many others, I have

suffered the consequences of exploring relatively new terrain, or, if you will, working on the "bleeding edge" of technology.

The complications of teaching with technology are illustrated by an ambitious multimedia project I gave my students during my first year in Japan. Preceding the project, students had made simple *HyperStudio* stacks of a few cards each—merging text, graphics, and sound (including their own voices) and linking the cards with buttons, in hypertext fashion. For the project itself, students in groups of four created elaborate—perhaps too elaborate—multimedia introductions to Nagoya. Students found pictures of local sites in postcards and tourist brochures and scanned them into their stacks; then they captured *QuickTime* movies of their subjects from a Chamber of Commerce video. They provided text by writing descriptions (using information taken from brochures) and their own letters welcoming potential visitors to their sites. They unified their projects with a menu stack that permitted navigation between the content stacks. I showed exemplary models of these projects at JALT in November of 1995.

Because of the logistics involved in teaching so many multimedia skills to classes of over fifty the project took most of a semester. Colleagues questioned the value of the assignment in relation to the time invested by asking, "Where's the language learning?" Of course, students had processed the English-language brochures and the video, and they had written two compositions in English for the text of their projects. Nonetheless, once I dropped my psychic defenses, I had to agree that the emphasis fell on multimedia, and that language learning was secondary. An assignment that would have been appropriate for native speakers was disproportionate for EFL learners.

Gradually, I have found better ways for multimedia to serve language learning. One way, adapted from the work of Linda Wickert, a multimedia pioneer in California, is to give students a teacher-devised template stack and let them assemble portfolios of documents they produced earlier in the year (Wickert, 1995). The template stack has a menu card that leads to other cards for various kinds of work—student goals, vocabulary words, major writing assignments, etc. The stack even has a place for the student's picture, taken with a QuickTake camera. (Student do not need to spend weeks of class time creating their own stacks of this kind when the teacher can make one in a few hours and let all the students use it.)

Among other uses of multimedia that emphasize language learning, students can browse *HyperStudio*'s CD-ROM disc of images and sounds, download pictures that interest them and then write about them—selecting among thirty possible topics that range from autobiography, to an advertisement of a product, to reflection on the state of the world. In another approach, students choose from a self-access library of CD-ROM discs, working in an English-language environment as they learn about ecology and geography, listen to music videos, or play mystery and adventure games. Finally, research assignments on the World Wide Web, in which students navigate hypertextually (and in English) across the globe, may represent the ultimate in language learning through educational multimedia.

Beyond the necessary balance between multimedia and language learning, other general principles exist for the appropriate uses of computer technology in the classroom. For one, technology should serve and enrich the curriculum—not drive it. We should consider pedagogical goals first, and only then ask how computers and multimedia can support them. Sometimes, pencil and paper are the appropriate technology for certain assignments. The computer is an immensely powerful tool, but it is not the only tool and, at certain stages or in certain kinds of student work, it is not always the most suitable tool. Another consideration is the difference between glitz and substance. A multimedia presentation can dazzle the eye and the ear with all kinds of special effects and make one forget that there is no real content. Ted Nelson (1993, p. 16) offers this pronouncement: "Instead of promoting mere mindless pointing and clicking, interactive media should be leading the way toward greater conceptual depth." If multimedia does not support language learning or higher-level thinking, it is not appropriate.

A New Kind of Literacy

The nature of communication is fundamentally changing in our time as multimedia pervades the general culture. With the rapid growth of the CD-ROM disc industry and the increasing presence of the Internet in business and in people's daily lives, students need to learn to use computers as tools for communicating ideas hypertextually. Schools and universities, conservative by nature and the last institutions to technologize, must respond to these changes if they are to survive in any recognizable form. Richard Lanham of UCLA warns that if universities do not do a better job of preparing students for the world they will live in, students, before too long, may "vote with their feet" and migrate to other institutions that may

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evolve to serve the globalization of business and industry (Lanham, 1993).

Multimedia and hypertext question and overturn many commonly-accepted views in the academic world, but perhaps none so dear as the notion of the "fixed" text with clearly-defined Aristotelian categories of beginning, middle, and end. Hypertext subverts this model, suggesting that nothing is ever finished, that each "end" is simply another "beginning," another jumping-off point for further exploration. The model of human knowledge proposed by hypertext is based not on individual books but on entire libraries—ones whose collections are constantly growing and interconnecting at an exponential rate (Lunenfeld, 1995).

When I first showed students the World Wide Web last fall, I was gratified that some recognized the essential nature of this new literacy. With the click of hypertext-highlighted words, we navigated from the Netscape Directory, to the Yahoo! Directory, to the sub-category menu for Society and Culture, to Human Rights, and from there to pictures and text about prisoners of conscience. Then we continued through other menus to sites on three different continents. Someone remarked, "It's like *HyperStudio*," and others nodded. It was simple branching and linking: the students were clear on the concept. They had understood the "grammar" of multimedia—the non-linear organization of ideas and information that is central to the current transformation of literacy.

The challenge of this new literacy facing all contemporary teachers is defined—perhaps surprisingly—by a classicist, Jay David Bolter:

> The printed book, therefore, seems destined to move to the margin of our literate culture. The issue is not whether print technology will completely disappear; books may long continue to be printed for certain kinds of texts and for luxury consumption. But the idea and the ideal of the book will change: print will no longer define the organization and presentation of knowledge, as it has for the past five centuries. This shift from print to the computer does not mean the end of literacy. What will be lost is not literacy itself, but the literacy of print, for electronic technology offers us a new kind of book and new ways to write and read.(p. 2)

Depending on one's disposition, these changes—which are historic and unstoppable—represent either a menace to civilization as we know it, or an unprecedented opportunity to accommodate all kinds of learners and all styles of learning in an academic world transformed and democratized by the digital revolution. While technophobes like Neil Postman (1992) issue jeremiads against the supposed decline of traditional literacy, other commentators—represented by Ted Nelson—take an ameliorative view: "By enabling people to visualize complexities that were previously beyond their grasp, interactive media can push the boundaries of understanding" (Nelson, 1993, p. 16).

A major complication of the current changes in literacy, particularly for language teachers and linguists, arises from the increasingly visual nature of communication. Richard Lanham (like Bolter, a classicist) detects a growing shift in the "alphabetic/ image ratio" in broadcast television, daily communication, and training procedures in business, government, and the military. While the "cultural prejudices of alphabetic literacy" make many in the academic world interpret these changes as a threat, others see them as a natural evolution of human communication and cognition that the academic world had better attend to (Lanham, 1993).

Similarly, Friedhoff and Benzon (1989) argue that we are coming to depend on visual intelligence as "a vital tool for conceptual thought in ways that were simply impossible before the digitalization of information" (Lanham, 1993, p. 125). Detailing the growing prevalence of visual thought and expression, Lanham cites Friedhoff and Benzon's observation of "the importance of computer-graphic illustration for medical and scientific research, for planning large-scale works of art, and for visualizing the behavior of what we have come to call chaotic systems of all sorts, artistic or scientific." Lanham (1993, p. 125) concludes, "We have to do here not with ornamentation of a preexistent rational argument but with an expanded sense of human reason itself." Multimedia, as part of the digital revolution, serves these transformations in communication, which, in turn, reflect the changing cognitive and epistemological models of the times.

Surely there will be ways for language teaching to adapt to and even take advantage of these shifts in human communication—in the short term with multimedia's rich audio and video support for language activities available on CD-ROM discs and the World Wide Web; in the long term with full-dress "virtual reality" computer simulations like those now used by the military to prepare people for situations they will face outside the classroom—which, when you think of it, is what language instruction is really for.

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The Effects of Learning Strategies in a CALL Laboratory – A Report from Tokyo Kogei University –

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CALL and Learning Strategies: Introduction

The Computer Assisted Language Learning Laboratory (CALLL), a multimedia laboratory, has been highlighted recently. This paper focuses on a CALLL system now in operation at Tokyo Kogei University (TKU) in Atsugi, Kanagawa. The purpose of this study is to find out how learning strategies in CALLL affects learning.

CALLL system at Tokyo Kogei University

The CALLL project team at TKU always keeps in mind the following two perspectives

during their on-going planning: 1) Language is a behavior; and 2) indirect learning strategies, including cooperative language learning, should be emphasized. Ahmad, Corbett, Rogers, and Sussex (1985) describe the potential of CALL under chaotic circumstances on the effects of approaches to the different cognitive styles of the learners. Computers in EFL, ideally, should serve to promote interaction that is beneficial for integrating language, cognition and social development. Recent discourse-based second language acquisition theory has emphasized the process of communicative interaction in language learning.

Let us introduce the overall system of CALLL at TKU. The teacher's control console has an conventional LL control unit, teacher's computer and monitor, and visual display equipment. Each student has a cassette tape recorder, a computer, a keyboard and a headset. Each computer is allocated to each student for individual or group work.

Aspects of cooperative learning should be reflected in the choice of hardware (including the physical setting) and software (including networking). From the interactional point of view, group work is considered to hold more opportunities for language use and development than individual work. Our CALLL is supported by the physical arrangement of students' desks as well as the networked system. During the year before introducing CALLL at TKU, we observed that students were more likely to tutor one another in groups than in individual work when doing listening tasks in a conventional language laboratory. This cooperation resulted in their compensating each other's shortcomings. They freely volunteered their ideas and guesses while working together.

Student booths are arranged on V-shaped desks. Four students sit at one V-shaped desk. The facilities offer flexibility in arranging a variety of interaction styles: individual work, pair work, group work, as well as lockstep exercises. This makes it possible for the teacher to easily vary group size and the structure of interactions. If two V-shaped desks are brought together they make one equal-sided square setting for 8 students. Three V-shaped desks can be arranged in a triangular pattern accommodating 12 students. Having students sit "face-to-face" creates many additional possibilities.

As for the computer work, the core group consists of 4 students. When the teacher switches to the networking mode, 4 students share one monitor although they sit at their own computers. They can enter text from their own keyboards, solve problems together, or write paragraphs with their group mates. That may give more opportunity to "acquire" a new language in addition to the "learning" of the language. Students confer with each other over the headsets as necessary.

CALLL program

The CALLL accommodates the following courses: English 1B (Basic Grammar and Basic Writing), Practical English B (an audio and video course focusing on conversation) and Academic Writing.

We would like to note the change of the teacher's role. The teacher becomes a facilitator rather than a lecturer or instructor. The teacher examines their evaluations, monitors their computer displays and listens to what they are listening to. One of the most important tasks of the teacher is to give feedback to each student. The teacher can show a model student's advanced progress on the built-in monitors. Students see how other students are doing. This drives them to practice more. Advanced students go further and further at their own pace. The teacher always joins in the group discussion and changes the group structures according to the difficulty of the task.

Effects of CALL Lab on the Learner Use of Learning Strategies

The idea of teaching learning strategies[1] might fit the need of corresponding with the changing demands of our society. Teaching learning strategies might possibly give more opportunity for taking in information in many styles by means of the use of their various aspects of intelligence (Shigemitsu & Tanabe, 1994).

Language learning strategies were combined with the CALLL at TKU to activate all aspects of intelligence[2] by integrating pieces of mixed media. Teaching language learning strategies provides students with the opportunity of forming the habits of good language learners, and the CALLL is supposed to support this extensively.

By examining the students' responses to the CALLL classes, the issues below were the points of discussion in the students' initial introduction to the CALLL (Shigemitsu & Tanabe, 1995). In the study, students' ideas about learning with CALLL were solicited through 14 questionnaire items. The questionnaire was given to the subjects, 185 university students, who were taking CALL classes at the time of the research. A questionnaire was given to the students after they had used the CALLL four times.[3]

The following are the issues dealt with:

1) The CALLL was very much welcomed by students.
2) Variation in teaching was certainly found to be important in satisfying students' needs. The use of the computer was highly rated and the newness of the methodology was also seen as a plus.
3) Some criticisms were made concerning motivational factors: "It's not different from regular classes" (12.5% of the negative answers); "I want more interesting classes" (33.3%); "The use of computers is insufficient" (33.3%); and "Grammar may be learned but conversation will not" (30.0%). These comments indicate that teachers should have sufficient knowledge about the merits of the CALLL and use its functions fully in order to realize ideal learning situations.
4) Comments such as "I tend to play with computers," or "Only computer skills will be learned," is a misinterpretation of the optimal linguistic circumstances. Since many of these students were accustomed to the traditional way, they have cultural and personal biases about how learning circumstances should be. It can be said that teachers must overtly explain the expected effects of the method and teaching philosophy.
5) Critical but implicit views about teaching with the CALLL were found. For example, those comments such as "I don't know" which comprised 42.5% of the comments made by students choosing medium, and 80% of those choosing negative also suggest that teachers need to give students justifications for the methodology and clear explanations of the teaching philosophy.
6) General learning preferences seem to transfer to the CALLL too. Just as in Nunan's study (1988), our results showed a preference for conversation and pronunciation but lower preference for listening.

Questionnaire—Results and Discussion

Tanabe (1994) compared the effects of teaching language learning strategies in classes taught explicitly and implicitly, and he found that there were no significant differences among the groups. However, the differences could be explained in relation to students' prior learning experiences (transfer of learning styles) and their motivation. Motivated students improved in their use of learning strategies. A different questionnaire was given to students to investigate their learning strategies in the CALLL.

Method

According to a proposal by Oxford (1990), 76 questionnaire items (See Appendix) were made under the 14 headings. The results were compared with the results of Tanabe (1994) of 29 business majors (23 male, 6 female), 32 economics majors (27 male, 5 female) and 65 English majors (0 male, 65 female) at two different universities in Japan.

Subjects

Sixty male students and four female students who were taking English IB in TKU. They had studied seven times in the CALL Lab over six months.

Results and Discussion

Large differences (Average or Kogei ≥ 10) were found only in "H" (metacognitive strategies) and "J" (affective strategies). The CALLL group ("Kogei") showed 10.9% less than the users of the learning strategies categorized under "H." This result seems to be related to the area of learning that the CALLL can cover. For example, in the CALL class various tasks are presented in a 90 minutes, and various approaches are possible, so the students might have difficulty in understanding the purpose of the tasks as a whole. This seems to coincide with the prior study of the introduction of the CALLL.

Under "J" (affective strategies), the CALLL group showed a 12.3% greater number of users of these strategies. The effects on the affective domain again seems to coincide with the prior study. Many learners answered that use of computers and the newness of using the CALLL facilities made their English class interesting. The fun they experience during the CALL lab might implicitly teach them to enjoy language learning.

In some other respects, the CALLL group showed a higher ratio of users, which were: D (1.7%), F (1.3%), L (1.3%), and N (1.7%). They are under the categories of cognitive, compensation, affective and social strategies, respectively. On the other hand, the CALLL group showed a smaller ratio of users in categories: A (5%), B (3.6%), C (0.8%), E (3.1%), G (2.4%), I (1.7%), K (7.2%), and M (4%). These are categorized under memory, cognitive, compensation, metacognitive, affective, and social strategies, respectively. There were no major differences between the

average group (Tanabe, 1994) and CALLL group except for the two above.

Conclusion

The CALLL seemed to give a positive effect by providing an opportunity to learn effective learning strategies. However, it also seemed to give a negative effect in teaching the use of metacognitive strategies. Further discussion and improvement of teaching methods and approaches are required.

Notes

1 In defining learning strategies, major studies have been done by Richards (1990), O'Malley & Shamot (1990), Oxford (1990) and Ellis (1985). Their studies provide the images of learning strategies such as being special ways of processing information that enhance comprehension, learning, or retention of information (O'Malley, 1990). Good language learners seem to be successful as they have a better understanding and control over their own learning than less successful learners (Richards, 1990). Oxford (1990), by giving examples from Rigney (1978) and Danserau (1985), concludes that it is useful to expand this definition by saying that learning strategies are "specific action taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations." Ellis (1985) also explained the mechanism as it has to do with the way the learners control the amount of input received and the way they handle this input.

2. Gardner (1983) said that in the process of achieving a goal of a task, students can get audio or musical, 3-dimensional, paralinguistic, affective, graphic, and linguistic information, separately or in combination.

3. The class of English IB (basic grammar and writing) meets once every third class.

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Appendix

According to the proposal by Oxford (1990), 76 questionnaire items were made under 14 headings. A questionnaire with 76 questions asking the use of each learning strategy was answered either by "Yes" or "No."

A. Words, idiomatic expressions, and structure learning (memory strategies): 1. categorizing words, 2. relating unknown to prior knowledge, 3. putting words in order, 4. putting words into a story, 5. having an image of vocabularies, 6. using a map, 7. using key words, 8. using phonics, 9. retrieving words, 10. using physical rhythm, sensual image, 11. making cards and lists, and 12. reordering cards and lists.

B. Learning, practicing (cognitive strategies):13. read and write repeatedly, 14. use phonics, 15. using rules and formula, 16. connecting known phrases to the unknown, and 17. learning naturally.

C. Facilitating understanding (compensation strategies): 18. using skimming and scanning, 19. compensating ability by referring to a script or other information, 20. applying general rules to the unknown, 21. decomposing unknown expressions to smaller units, 22. applying grammatical rules of Japanese, 23. translating, and 24. using Japanese words, the ways of thinking, etc.

D. Receiving and sending messages (cognitive strategies): 25. taking notes while listening, 26. drawing charts and pictures while listening, 27. summarizing, and 28. emphasizing with markers, underlining.

E. Inferring in listening and reading (compensation strategies): 29. resorting to prior knowledge of vocabularies and grammar, 30. inferring meanings from contexts, 31. guessing from situation, 32. guessing from the tone of voice, 33. guessing from gestures, 34. guessing from facial expression, 35. guessing from real world knowledge, 36. guessing from tables and figures, and 37. guessing from the topic or the discourse knowledge.

F. Speaking and writing (compensation strategies): 38. using Japanese words for unknown words, 39. asking for help from other people, 40. using body language, 41. avoiding topics, 42. Choosing favorite topics, 43. modifying messages, 44. connecting words, and 45. circumlocution.

G. Concentration on the specific skills (metacognitive strategies): 46. knowing the purpose of the learning, 47. learning words for specific purposes, 48. learning specific skills, and 49. learning listening before speaking.

H. Planning learning (metacognitive strategies): 50. getting information about effective learning strategies, 51. making a learning schedule, 52. optimizing physical environment for learning, 53. setting a goal for each learning task, 54. setting a goal for the achievement of ability, 55. trying to understand the meaning of the task, 56. learning for specific purposes, and 57. trying to maximize learning opportunity.

I. Self-evaluation (metacognitive strategies): 58. finding errors and eliminating them, and 59. having self-evaluating method.

J. Mental control (affective strategies): 60. trying to relax while learning, 61. having a relaxing strategy, 62. using music for relaxation, and 63. trying to enjoy learning.

K. Motivating (affective strategies): 64. self-evaluating achievement, 65. putting him/herself into the situation where English is indispensable, and 66. self-praising, give awards to him/herself.

L. Physical and mental control (affective strategies): 67. self-monitoring psychological state, 68. checking feelings, attitude, and motivation, 69. recording feelings after learning, and 70. discussing feelings with someone else.

M. Communication (social strategies): 71. asking for clarification or verification, 72. asking for correction, 73. cooperating with peers, and 74. cooperating with proficient users of the target language outside of class.

N. Understanding cultural differences (Social strategies): 75. developing cultural understanding, and 76. becoming aware of the thoughts and feelings of others.

An Adjunct Model in the Computer Classroom

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Miyazaki International College is a new four-year liberal arts college. The entire curriculum, except for Japanese language courses, is in English. One of the unique features of the college is the use of English adjuncts in the first two years. In other words, every content class has an accompanying English language class. Teaching pairs work out between themselves how to structure each class; some pairs adopt an integrated approach in which the adjunct literally becomes the bridge to the content, while others maintain a strong delineation between the two parts of the class which may result in the adjunct working on language issues indirectly related to the content.

In Applied Information Science (AIS), the course professor, Jim Kieley, and I decided to employ the former approach. Content would be supported by English instruction through an integrated model. After much debate and discussion, we decided the use of projects would best facilitate an integrated adjunct model since we believed a well-designed project could effectively combine language and computer skills.

There are as many definitions of project-based teaching as there are projects. We took the idea of project to mean that students would

work independently. After we gave them a basic outline of the project, the students selected what aspect they wanted to work on, located and organized materials and presented the end product within a defined time frame. Responsibility for each project's success clearly rested in the hands of the students as they applied their learning to real problems. Thus, the project allowed students to express their interests and to demonstrate what they were capable of doing in an independent environment. Moreover, we hoped that the project would motivate and involve the students in the class.

We divided the content of the course into roughly three sections: the first section was devoted to computer and language basics; the second section introduced the idea of a project through some structured mini-projects; and the final section of the class focused on the project and provided any additional training the students needed in order to complete the project.

Since environmental issues are an underlying theme at Miyazaki International College (MIC), we felt a paperlite class would demonstrate to the students how they could put environmental responsibility into practice. We created our course book on the World Wide Web (WWW). The class homepage included the syllabus, readings, assignments, quizzes, help documents and, of course, links to Internet resources.

The First Section

We assumed that the students would come into an introductory class with a minimum knowledge of computers, basic applications, computer networks and the Internet. While this assumption quickly proved to be correct, we were surprised to discover that students also lacked even basic typing/keyboarding skills.

To remedy the lack of typing skills, we showed the students the *Mavis Beacon* typing program and encouraged them to come in and practice during their free time. We instituted a weekly typing competition to ensure students would practice and improve. The students were put into four-student groups with approximately the same average typing speed. The typing results of each group were posted on the AIS homepage and compared weekly. By the end of the semester the majority of students had reached the stated goal of 15 words per minute.

During this time, students were also introduced to *Microsoft Word*, a word processing application, and *Pegasus Mail*, an e-mail application. The instructor's computer at the front of the class was connected to an overhead projector with an LCD panel. Images were projected onto a large screen in the front of the room and two 21-inch ceiling-mounted monitors in the middle of the room. All applications were introduced using a "see and do" model — the students watched and followed on their own computers. To help the flow of the class I usually monitored the students, indicating to Jim when all the students were on track and helping out those who got lost. I also noted new vocabulary and structures that were used frequently in those sessions.

The focus of the language instruction during this period was intensive work on vocabulary development while providing some strategies for dealing with all the new vocabulary. We also worked intensively on getting the students to understand and use some of the basic Macintosh operating system language that students needed, no matter which application they were working on in a Macintosh environment, e.g., go to X, open X, select X, delete X, in addition to the language they needed to function effectively in the MIC network environment.

The Second Section

We introduced the Internet, specifically the World Wide Web, during this phase of the class. We focused on using the Web as a research tool. At first, students were given simple scavenger hunt type activities in which they had to use different search tools to find specific information on topics of the instructors' choosing. Later, students had more freedom to choose the topics they would research; however, students were asked to focus their Internet searches to topics that were of interest to them or of possible use in their classes at MIC. Language instruction highlighted learning how to reference Internet resources, summarizing the information and judging the usefulness of the resources.

Interspersed with the skills training during this time were several short lectures on various aspects of applied information science, including the computer as a system, the history of information science and computer networks. In addition, a guest speaker demonstrated how sound could be manipulated using the MIDI system.

The Final Section

As we were planning a project-based class, Jim and I agreed that there needed to be a unifying project theme which the individual student projects would support. We also wanted the final product to be useful. With this in mind, we settled on the theme of an electronic guidebook to Miyazaki called *Miyazaki Viewpoints*.

Our expectations were that the students would decide on which aspect of the Miyazaki area they wanted to research, find and organize the information, and then put it into a format that could be viewed on the WWW. They were also expected to give an oral presentation on their finished product.

In order for the students to accomplish this, we had to spend some time teaching them how to format information, i.e., text, graphics, sound or video, for the Web. Students used the following applications: *HTML Pro* for creating HTML documents, *Sound Edit Pro* for creating sound files, *Adobe Photoshop* for creating graphics and working with scanned images, *Movie Player* for capturing video and *Graphic Converter* and *GIF Converter* for converting graphics to a gif format.

Based on the experience I have had using projects in other classes, I felt it was important in this project for the students to have clearly defined tasks and due dates with progress checks built in. While some may argue that this kind of structure lessens the value of project-based work, I would reply that you have to weigh student autonomy against student capabilities. I wanted to ensure student success in the project and felt without these guides students would flounder, especially since this was the first time for many of them to do project-based work.

Inasmuch as information on the Web has the potential of being viewed by millions of people, it was important to us as instructors that any text be of a high quality. We stressed the importance of well-organized, well-structured writing to the students. I tried to edit every piece of writing before it was put on-line. I attempted to have the students correct their own work by providing feedback on it, but often we would sit down at a computer and make the corrections together. While there are still errors present in the work, I felt it was important that blatant errors and misspellings be corrected before others viewed the project.

Overall, we were pleased and surprised at the quality of the final results of the project. Almost every student gave the project his/her best effort — and it showed. *Miyazaki Viewpoints* gives an honest and informative overview of the Miyazaki area. I hope others will enjoy looking at it as much as we enjoyed putting it together. The address is:

http://www.miyazaki-mic.ac.jp/classes/ais/ais_95/proj95.html

Looking back over the semester, I have to ask myself if I would do project work again. I have to answer yes. A project-based class did allow all the positive things we thought would happen to happen. The projects allowed the better students to show off their talents; it gave all the students a way to apply their knowledge; it forced students to use problem-solving and decision making skills; and it motivated and involved the students in the class.

However, projects are not without their pitfalls. Anyone wishing to use projects in their courses must be aware of them. Projects must be well-designed, even a very small-scale project. It is crucial for a project developer to think out to its conclusion a model of that project. A project that is not well-designed creates confusion and frustration for everyone. Projects take a great deal of time, both in preparation and actualization. We had to drastically reduce the amount of technology we wanted to introduce to the students when we decided to use projects. Students must have adequate preparatory training before starting on a project. Much of our time was spent showing students how to format the information they gathered to the Web. Students need structure in order to successfully complete a project. The amount of structure will, of course, depend on the language capabilities and the previous exposure to projects that your students have had. We suggest, at a minimum, making everyone aware of the project deadlines and building in progress checks. Projects are difficult to grade, especially if you do not have progress checks and only grade an end product. And finally, not all students work well in an independent environment.

My project-based class of the future might have the following recommendations incorporated into it.

Recommendations

1. Set the project theme.
2. Make sure the project is something the students can easily do on their own. Are there ample resources available?
3. Allow students to work in pairs if they want.
4. Provide time management training.
5. Approve the student aspect of the project before the student begins gathering information.
6. Break the project up into stages and provide clear goals for each stage.
7. Provide a model of each stage.
8. Provide any training the students will need to do at each stage. For example, if you expect the students to conduct

interviews, you must make sure students know how to introduce themselves and their project, break the ice and initiate the interview, develop good interview questions, thank the interviewee, write up the interview, etc.

9. Develop progress checks and forms for reporting progress for each stage.
10. Develop grading criteria and grade each stage of the project.
11. Develop clear guidelines for any writing to be done and require drafts.
12. Allow sufficient time for the students to complete the project.

Projects are a valuable teaching tool if used correctly and these recommendations can mean the difference between a successful project and one that doesn't work.

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Using Computer Networks to Facilitate Communication: Network Projects at Chubu

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Introduction

Extensive research suggests that in order to enhance language acquisition, we need to provide students with opportunities to use the target language in a real communicative manner (Krashen & Terrell, 1983; Brown, 1995). E-mail provides a multitude of opportunities for authentic and meaningful communication (Warschauer, 1995). Since e-mail is a fairly new medium, we have conducted a series of e-mail penpal (keypal) projects with Japanese university students to determine how and if e-mail serves to motivate students and possibly to improve their English proficiency more efficiently than other conventional methods of teaching. Students were not graded on their work but some did receive extra credit points for their participation.

Four major projects have been conducted since April 1994. Some of them were a semester long, and others were on-going open-ended projects for motivated voluntary students. Among them were an e-mail exchange project between students at Chubu University and Chubu students studying at Ohio University, U.S.A. (Project 1); a "closed" in-house mailing list discussion group involving more than 10 language teachers and students on campus (Project 2); and an intensive writing project using an Internet newsgroup system (Project 3). Our data gathering techniques were both quantitative and qualitative and included teacher and student questionnaires and analysis of e-mail correspondence. These three projects are discussed and evaluated below.

Descriptions of the Three Projects

Project No. 1: E-mail Exchange with Japanese Students Studying in the U.S.

Two groups of students from Chubu

University, Japan, were involved in keypal exchanges with each other. Group 1 consisted of 35 first year International Studies students and Group 2 consisted of 15 International Studies students and 15 Engineering students who were attending Ohio University for two quarters on a study abroad program. Neither group had previously known each other or had any familiarity with computers. In the beginning of the first semester, the students both in the U.S. and in Japan were given a few orientation sessions on how to use an e-mail system. For most of the students it was their first time to even touch a keyboard. Each student was matched with two students from the other group on a purely random basis. They were asked to exchange messages weekly on any topic of their interest.

At the very beginning stage, only a few networked Macintosh computers were available for the students at Chubu University. Therefore, the students were asked to write messages outside of class when they could find time and available computers, and to mail them through a local network to their teacher who had access to the networked computer.

The information topics included popular music, sports, social life, academic courses, and personal matters. However, it seemed a number of students in Japan were interested in knowing about their keypals' life in the U.S. and those in the U.S. about what was happening in their home university and home country. As the project developed, the students became so interested that some started to exchange two or three e-mail letters a week. A few students wrote messages almost everyday.

On the Japan side, the exchanges took place on an Internet mailing list and hence were not private. Students sent and received e-mail helped by a software program called *Eudora*. The program automatically delivered the messages to all the students involved in this project. The software also automatically downloaded the messages into a mailbox for each student and had a variety of features like an automatic quote and reply command. Although each message sent from the U.S. carried the names to whom the message was written, everyone was allowed to read and respond to the message he or she opened. This was so designed so that those who were motivated could write to more than two people and the teacher could monitor the exchanged messages. On the U.S. side, the students were assigned to go to a computer center at least once a week to read messages and respond directly to their keypals.

The project lasted for 15 weeks. When the exchange students came back from the U.S., the two groups met each other at a get-together party at Chubu University. The students enjoyed this chance to talk to friends that they had previously only known through the computer screen.

Project No. 2: A "closed" Mailing List Discussion Group

This project involved 79 students of English at Chubu University. The majority of the students were from two International Studies Department English classes; 35 from a 1st year class and 20 from a 2nd year class. The other students were individual volunteers drawn from 2nd year International Studies Department English classes and from a group who had spent the previous semester studying at Ohio University. The latter group came from a variety of majors and academic years. In addition to the students, eight instructors participated in the project. The length of the project was one semester. All of the participants were students at Chubu University in Kasugai, Japan. Approximately half of the students had previous experience using e-mail in an earlier project. This format is appropriate for elementary and intermediate level users of the target language. The project took on the form of a closed list rather than a penpal exchange. Group 1 and ten students from Group 2 who had returned from Ohio continued to participate. They were joined by a class of 20 second year International Studies students and 14 volunteers who were also second year International Studies Students. Eight English instructors participated as well. Participation was required for the first two groups mentioned above. However, the quality and quantity of their contributions to the list didn't affect the students' grades. As mentioned above, participation by the other students was voluntary.

The students' first assignment was to post a self-introduction to the list. After reading the initial postings, the students began to respond to one another. These early postings were not very long and contained little detail, so the participating instructors began to respond to the students and prompt them to expand their ideas and further explore certain topics. This lead to an interesting development. The students began to direct explanations of their earlier postings and questions to individual instructors.

In some ways this development was quite useful. The students' curiosity about the instructors opinions and experiences motivated them to pursue topics in greater detail. The topics included life in foreign countries, how to study/improve English, entertainment, part-time jobs, love, and non-Japanese perceptions of Japan. The

instructors then turned the questions back on the students. This pushed the students to write longer and more meaningful messages.

Project No. 3: Intensive Writing Project Using NewsGroup

The class was divided according to their experiences overseas. The students who had been abroad (3 to 4 students per group) were assigned to write about their cross-cultural experiences, their surprises or any interesting observations about life overseas. The students without overseas experience were assigned to write about things or events particular to Japanese culture. The groups then decided what to write. This was the first time for all the students to use computers in writing. The class was team-taught by a native speaker of English from the United States and a Japanese.

We set up a local net news group for for out-of-class writing. We used an Internet News browser software application called *News Agent*, a freeware program which runs on Macintosh computers. The software helped the students sort the message-comment chain and quote and add comments to messages easily. We decided to use the whole semester to write only one essay per group. The students were advised to contribute not more than one paragraph each week and to read the instructors' comments. They then revised their work and went on to the next paragraph. This step-by-step instruction was necessary because students had had little experience in composing essays. Previously, they had only done sentence to sentence translation practices from Japanese into English.

Besides pointing out fundamental grammar errors, the instructors focused on helping the students strengthen their skills in organizing paragraphs. The instructors gave advice on how to: a) use plain words, b) avoid repeating the same words and/or expressions, c) avoid biased or misleading expressions, d) develop simple, clear and logical paragraphs, e) present their findings in simple but effective ways. Accordingly, the students were advised to discuss in groups how to improve their pieces every time they read comments from the instructors. Also, they examined the difference between what they wrote and what instructors wrote if any alternative expressions were given.

Results and Discussion

Project 1

According to the survey conducted after the project, we found that the project was accepted very positively by the participants in spite of the fact that we had several technical difficulties during the early stages. Four out of five students expressed that they wanted to continue the same kind of project (and we did in a different format). We also found that through this project our students became more interested in learning English and foreign cultures than before. They expressed that their overall English may not have changed noticeably by participating in this project, but their writing skills and willingness to express themselves in simple English had improved drastically. This was seen clearly in the increased length and number of messages they wrote towards the end of the project. Below are the summaries of a number of e-mail messages exchanged and the students' evaluation and comments on the projects.

What was Difficult?

- My English was so poor.
- I didn't have enough time.
- I had never touched one till then.
- Tried to send many times but succeeded only a few times.
- We were too busy with school work.
- I was afraid to break the computer.
- I didn't receive many letters as expected.
- I wanted to read all the letters, but I had to wait till a computer was available.
- Yes. It was fun to correspond overseas.
- Of course, because I want to continue communicating with OU students and teachers.
- Yes, because it is a good exercise to use a computer.
- Yes, because I want to communicate more with people.
- Yes, because it is so convenient.
- Yes, I believe my English will improve if I continue.
- I felt so happy when I received a letter.
- Yes, if the partner makes sure he will write back to me.
- We took so much time and trouble to learn the computer. Why should we stop now?
- No, because nobody returned me messages.
- No. I live far away from here. I had no time.

There were several difficulties and drawbacks. The participants lacked keyboard skills and there were very few computers available. Since the students had had no previous experience with the keyboard, writing messages on the

computer screen was an incredibly time consuming process. Consequently, some just gave up halfway and never wrote a message after the initial painful experience. Also, we had only two computers networked for 35 students at Chubu when this project started and, what was worse, these computers were available for students only from 10:00 to 5:00. However, the participants somehow continued the project. This suggests that it is possible to start an e-mail project with a limited number of computers if we have some creativity and patience.

Other challenges resulted from the demanding schedule of U.S. college life and the incompatibility of Chubu's semester and Ohio University's quarter schedule. The participants at O.U. all wanted to exchange their messages more often and had the facilities to do so, but since they were so busy fulfilling other course requirements and this project was not evaluated, some unfortunately did not write as often as they wanted. If this project had been a part of their registered course work and had been evaluated on some kind of basis, they might have written more frequently and had longer messages. Furthermore, there was a week break at Ohio University in the beginning of June while the Chubu semester ran continuously through the end of July. An unexpected inconvenience occurred during this break, when the mailing system and the account given to each student from the university were automatically changed. Thus, the teacher had to give another orientation session to familiarize the students with the new mailing system. During this lag time, the students at Chubu lost contact with their keypals temporarily but began actively exchanging messages with their classmates instead. They discussed boyfriends/girlfriends, weekend plans, summer plans. This shift developed on its own without any type of teacher suggestion or intervention.

The last problem was a serious one. Some students complained that they never received messages back from their keypals and therefore they quit sending messages. It is very important to let the participants keep in mind that unless they send messages they will not get messages sent directly back to them. E-mailing is a two-way street and both sides should work equally hard.

From the survey, we also learned that direct personal messages were sent more frequently than we realized. Originally the keypal exchanges took place in a list format and hence were not private, but the students figured out themselves how to send personal messages to their keypals directly off the list and they did so. Despite the fact that those students did not follow the directions we gave, we felt very pleased to know that the students were independently sending messages for communication purposes, which will eventually help them acquire the language.

To sum up, the project involved a lot of energy and time on both the part of the teachers and the students, but the rewards and benefits we received were far greater than the trouble. We encourage the readers to start a similar project.

Project 2

The most positive aspect of the project was the students who found that they could communicate using English even if their skills were not so strong. As seen in the table below, the students didn't feel that their English improved much as a result of participating in this project, but they felt a stronger motivation to improve their English and communicate their thoughts more clearly.

In addition, one class experienced a side benefit in that the classroom atmosphere improved because of the exchange of views and information on the mailing list. Some students commented that even though they were physically in the same class, they only came to have a good understanding of their classmates through e-mail. At the end of the semester, the students completed a questionnaire and rated the project in a number of areas. Seventy-five of the 79 students responded to the questionnaire. The results are shown in the appendix.

The following charts describe the areas of difficulty and frequency of exchanging messages. Again the most difficult part in participating in this project was not having enough time, followed by writing in English and deciding what topics to write about. Since some of the participants had experience in using computers in the previous semester, they did not feel using the computer was as difficult as it was in the first semester.

Since time was the most difficult constraint, most students did not write as often as they originally expected. As many as 40% of the participants wanted to correspond at least once a week initially, but only 18% of the participants did so and 17% corresponded twice or three times a month. The following chart shows the results very clearly. Some students never wrote messages. This is because when they first started to use the computer, they were totally confused and since this project was not forced on the students, those who felt uncomfortable at the initial contact with the computer chose not to write a message after their first attempt.

The topic that the students considered most interesting was personal information. Since personal messages were the messages mailed to them personally and the contents were extremely meaningful to that individual, it is understandable that personal messages were most appreciated by the participants. Some of the most frequently exchanged messages were as follows:

- messages written directly to me
- experiences of the other students
- foreign countries
- how to study English
- interest of the other students
- hobbies
- movies/music
- daily life
- sports
- love
- part-time jobs

Students were also asked to make additional comments on the project. The comments were a bit mixed. The students who frequently read and posted to the list had positive reactions and those who didn't participate regularly gave a variety of reasons, including lack of time and difficulty in using the computer. An extreme example of the positive reactions of the former group can be seen in the following comment:

> "I am full of my life!!! One of the reasons is 'E-mail'... Through E-mail, I could get acquainted with various people. I am happy!!!"

Project 3

The questionnaire given to the students at the end of the semester showed the benefits of this approach as follows: First, in writing, a) many of the students started to learn how to type and to use computers, b) they learned other ways of writing from members of their group and those in other groups, c) they learned how to choose plain words and/or how to consult dictionaries in practical ways, d) they enjoyed reading about other people's experiences overseas, and e) they had opportunities to think about cross-cultural experiences as well as finding simple and effective ways to explain their own culture; Second, in reading the comments from the instructors, a)opportunities for them to read English out-of-class were increased, and b)they learned which parts of their paragraphs were unclear, off-topic and/or misleading to readers; Third, in doing their own revising, a) they found steady improvements in their writing, b) they reviewed their grammar errors from a practical perspective, and c) they learned from comparing what they wrote with the instructors' suggestions.

In the course of advising the students through Internet Newsgroups, the instructors could find what common errors the students were likely to make, which led to in-class grammar explanations from time to time. The instructors also gave the students many reading materials on related cultural topics and this helped them learn how paragraphs were developed. In after-project evaluations, about 70 percent of the students answered they want to continue to use computers if they have another chance at this kind of intensive writing practice. Those who preferred conventional (paper-and-pencil) writing seemed reluctant to use computers throughout the semester because of the difficulty in getting used to typing or a general unfamiliarity with the machines.

This year's continuation of the project will add another dimension. Students will be paired with "keypals" from a country or countries outside of Japan. In the writing of their essays, this will provide the students with additional input about the target culture which they are writing about. Additionally, it will provide students with an additional level of feedback from another student of English (or perhaps even a native speaker). In informal interviews, students have already expressed a great deal of interest in the widening scope of this project.

Conclusion

Through the above three different e-mail projects, the authors gained a number of valuable insights. They learned that this kind of project motivates the participants to learn the language. This is probably because they are given an opportunity to use the foreign language for the purpose of genuine communication (for some of them the first time in their lives). What they exchanged using the network was not something which did not have a reader or whose reader was only their teacher. They each had several readers of their messages and each participant had his or her own reason to write messages in English. They used the language to communicate in a real-life situation. The whole activity was not a practice for some kind of future possible communication opportunity which might or might not take place, but their e-mail exchange was the communication itself. The authors also learned that the majority of participants were generally satisfied with their experience with the network. Therefore, for some reticent Japanese students, this teaching method

may provide a totally new incentive to learn the foreign language. They also learned that those who were motivated could learn the language on their own since the opportunity is already provided. Some even started sending e-mail messages personally to people not involved in the projects at all in their free time. This suggests that they themselves searched for communication opportunities through English, which is rare in a conventional language teaching environment. The network also enabled them to learn the language in an inductive way. By exchanging messages with native speakers or people with better English proficiency in the world and by being constantly given models that they could imitate, they could learn various rules of the language, without noticing that they were learning these rules because what they were concentrating on was the message, not the structure of the language.

There are a number of concerns in conducting this kind of project. The biggest one is to find out if the participants are really acquiring language competence by participating. The feedback from the participants implies that they learned the language, in a fun and meaningful way, but they were never sure to what extent the e-mail projects contributed to the participants' language learning and how effective the projects were in terms of language learning compared to conventional ways of teaching. More empirical studies are definitely needed to answer this crucial question. (Imamura & Shiozawa, 1995; Shiozawa, Imamura, Schiefelbein, Oguri, & Ozeki, 1995). However, one thing we need to keep in mind in conducting empirical studies is that it is not because the students used the networked computers that they learned the language in an effective manner, but it is how they used the network. Finding effective and efficient uses of networked computers for language learning is the task language teachers and researchers need to undertake.

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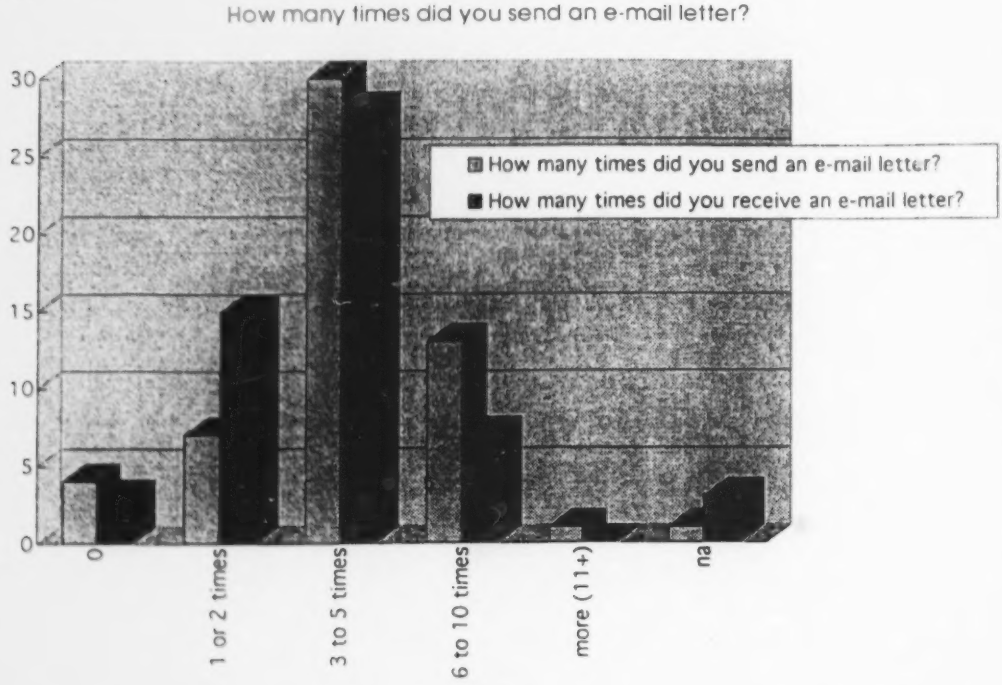
Appendix A



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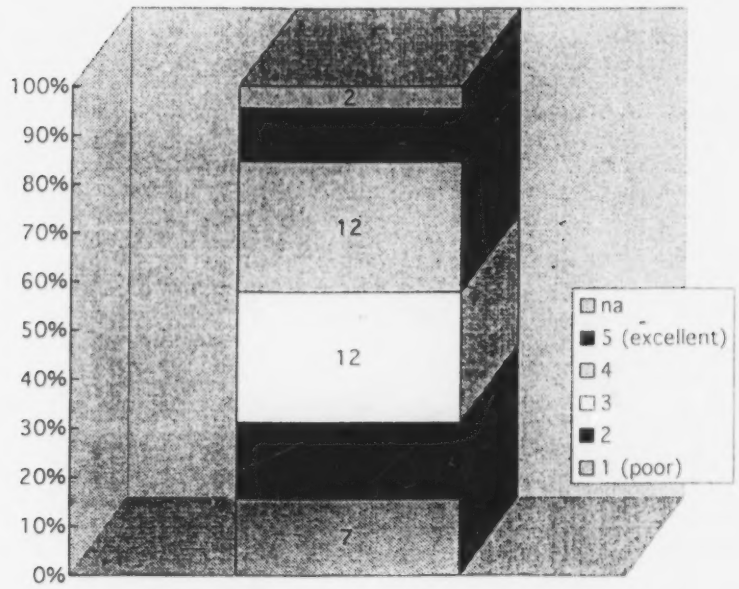
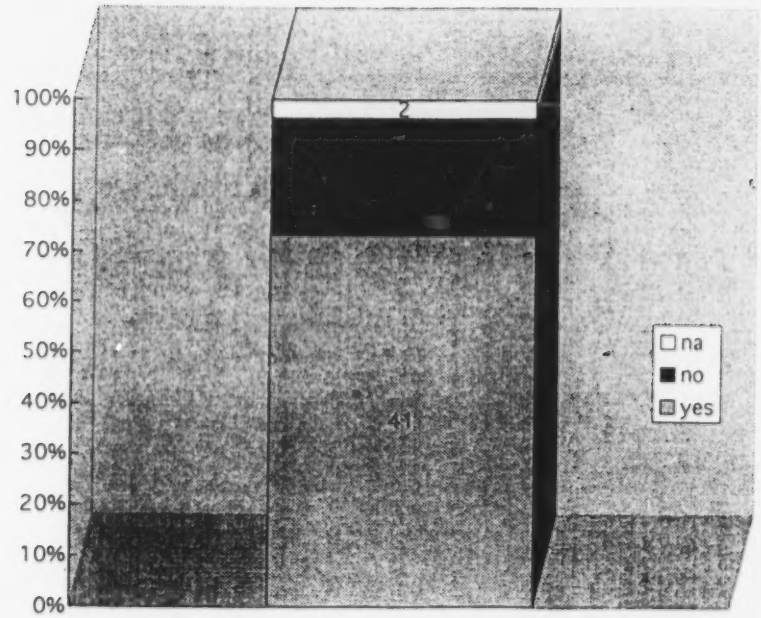
How would you rate this project on a scale of 1(poor) - 5(excellent)?



Would you like to continue using e-mail?



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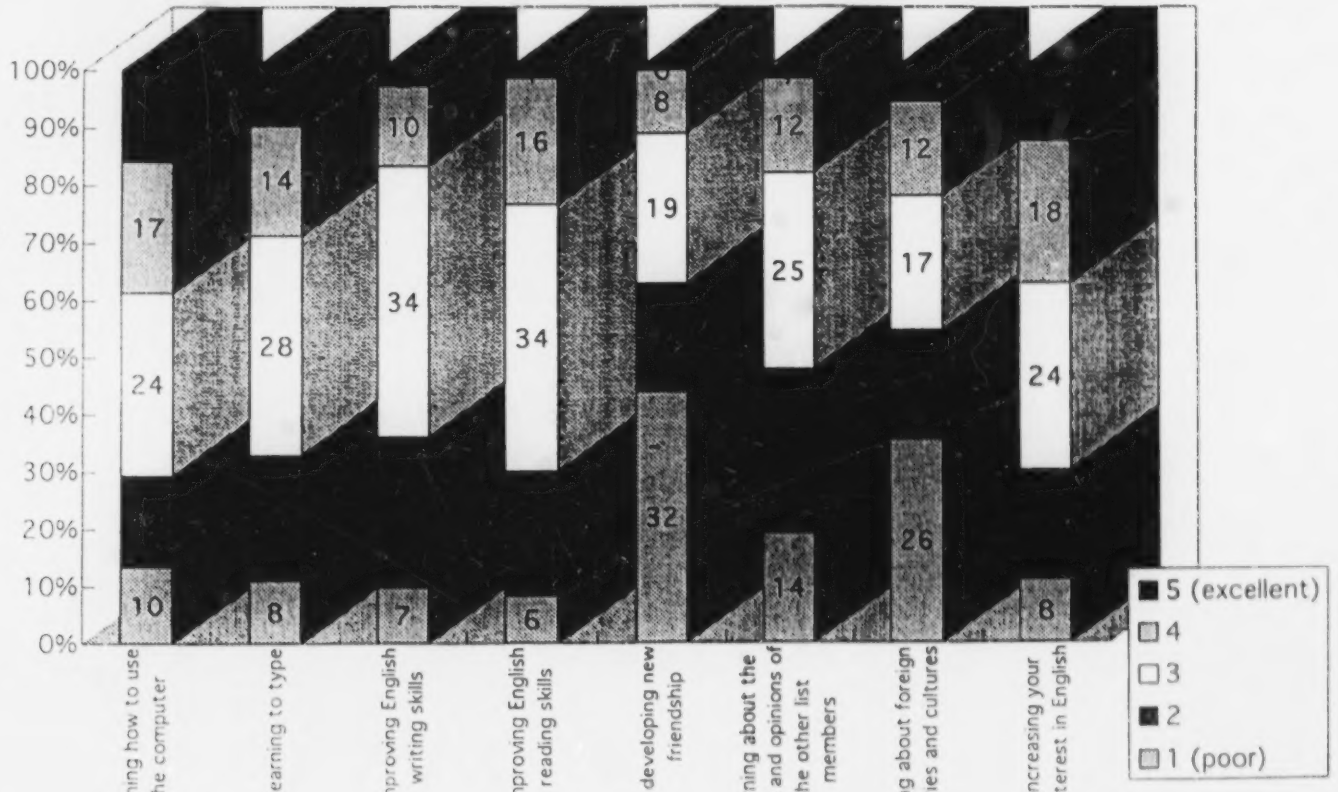
How would you rate participating in the e-mail list on a scale of 1 (poor) - 5 (excellent) in terms of the following?



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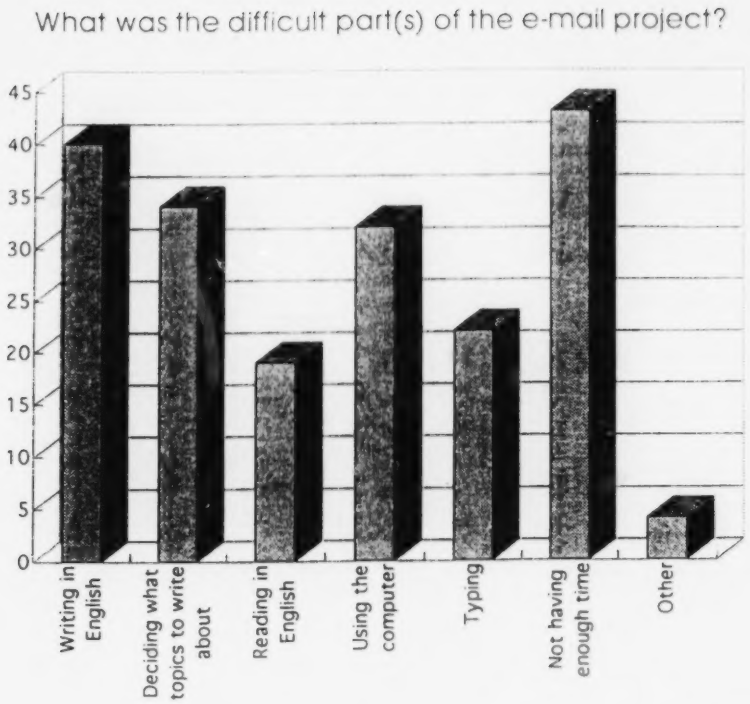
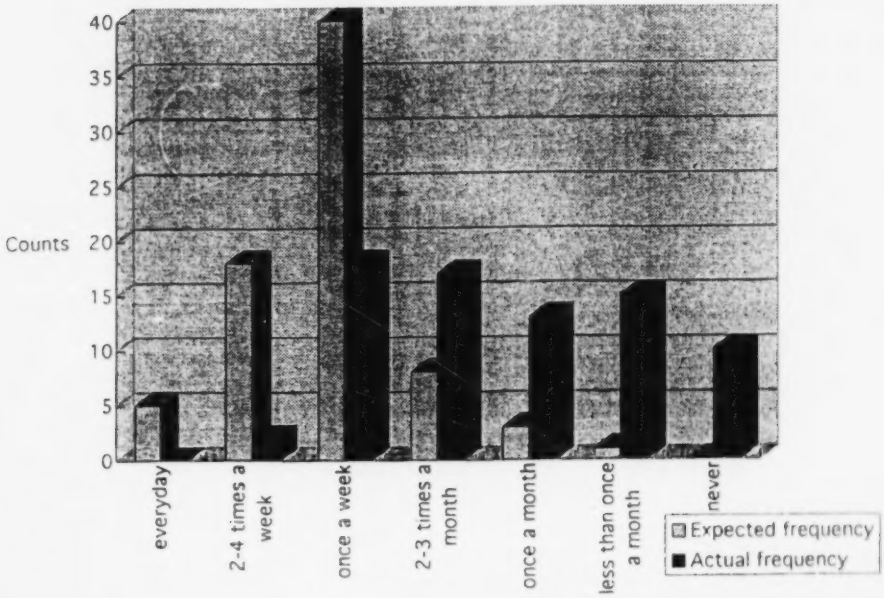


The initially expected frequency of sending messages vs. the actual frequecy by each student



Appendix B

Sample Message (unedited, original) from Project 1: Ohio-Chubu Keypal Exchange

Date: Sun, 12 Jun 1994 14:55:08 -0400
From: OPIE <opie23@.....cats.ohiou.edu>
To: culc-is@.....solan.chubu.ac.jp
Subject: (culc-is 352) From O.U. #5th

Dear Y and R,

Hi, how are you doing? Well, have you ever gotten my mails yet? You said that I didn't send a message. But, I sent massages once a week by now. I think this is something trouble. Please check to your teacher. Your teacher may have my letters.

Well, last week I have been to Washington D.C. I had a fun so much. There were many memorials, monuments, and museums in Washington D.C.,and we can go there on foot. So,we walked so much,and I was so tired. Washington D.C. is very clean andmore room and leisure than Japanese capital,Tokyo. But, there is very dangerous. In the night,African-American(black people) was walking around the city. Well as I bought gifts whenever I visited certain structions,I result in a poor man.

I have to plan after my life. That's all, today. See you lator!
M.S.

Sample Message from Project 2: On-Campus List Project

>Date: Fri, 2 Dec 1994 11:57:08 +0900
>To: nlc@clc.hyper.chubu.ac.jp
>From: n9...@...hyper.chubu.ac.jp
>Subject: [nlc 399] Re: Speaking English
>Sender: owner-nlc@....hyper.chubu.ac.jp

Original message
>>>> Hello!Everyone.
>>>>I have a serious problem.I wan' to speak English more fluently.
>>>> But, my pronunciation is not good.
>>>> If you have a good idea, please tell me!!!
>>>>M

Reply 1
>>>Dear Marie and everybody who is worried about his or her pronounciation.
>>> Here is my suggestion: Stop worrying. As long as native English
>>>speakers understand your English, your pronounciation is OK, no problem,
>>>fine, good, super, well-done. What is important is what you can say in
>>>English, not how you say it. Relieved?
>>> If you still do not feel better, here is another key: Enjoy your
>>>English class at school. Listen to your teacher and yourself very
>>>carefully and try to immitate your teacher or the tape you listen to.
>>>Oguri senset has native-like pronounciation. Ask her how she has aquired
>>>her pronounciation.
>>>Good luck.
>>>T.S. (teacher)

Reply 2
>>M-chan,
>>I agree with S-sensei 100%. What you say is more important than
>>how well you can pronounce a word. Your worry received lots of response
>>and no body says you should improve your pronunciation, right? So, don't
>>worry. Nobody is perfect!
>>OK, you still think you need to improve your pronunciation. Follow
>>S sensei's second advice. I don't think I am good enough yet but
>>I'll tell you what I have done and am still doing. I enjoy listening to
>>English. I like the sound of it somehow. I don't know why. I've tried
>>and am still trying what translators call "Shadowing" since I was at
>>college. (Not many years ago???!!!) Well, as I've tried this in your
>>English class, you'd know what it is like. Very difficult, did you think?
>>Play any monologue (dialogue type does not suit this practice) tapes and

>>practice. I still do it from time to time when I drive. "Shadowing"
>>practice HELPs you correct your pronunciation, motivates you to catch up
>>English(your listening ability) and also improves your concentration. Don't
>>you think it's worth trying? Please talk to me anytime, ok?
>>Anyway, please keep in mind that there is no other way to improve your
>>English than using it. Go talk to the students from Ohio and Melbourn.
>>Don't be afraid.

Returned Reply
>Dear my teacher
> Thank you for your reply.I'm glad to hear that.I recovered confidence.
>Oh,I have a second problem. To tell the truth, I want to
>go abroad just now! Can I absent your class for a long time? But,
>I haven,t lot of money. It's kidding!
> Sincerely yours

CALL: Its Scope and Limits

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The rather pretentious title of this paper is meant to indicate that I propose to survey the grand sweep of what is, and what could be, in CALL. My approach to these two questions is to outline a general description of CALL using the basic notions of "dimension" and "space" as found in mathematics or physics, to provide a general framework within which any specific CALL object—most likely a piece of software—can be located and described. Using such a framework, it is possible to describe and compare widely differing CALL examples with a common reference language. The framework also illuminates what may be the most promising lines for future CALL development and suggests why these lines have received less attention than their importance would imply.

Deviating from the standard flow of academic presentation a bit, I would like first to suggest some limits to CALL in the far and near future, and the present state of the art. I call these, respectively, "The Star Trek," "2001," and "Now" scenarios. In the Star Trek scenario, a CALL system instantly integrates the target language in all its fullness into one's mind, completely linking the language into one's own experience and behavior. One instantly acquires native fluency the new language. The far more modest 2001 scenario involves an ideal blend of human and machine. It is fully human as a conversationalist and tutor, but scrupulously systematic in its analysis of an individual learner's weaknesses, selection of teaching strategies and materials, and accumulation of learner responses and performance histories. It is thus like a talented teacher with a perfect memory and unlimited library. Now, we are, of course, far from either of these futures. Most CALL involves keyboard/screen interaction and basic audio/visual multimedia. The activity flows linearly toward some short-term goal and the results are summarized in simple statistics such as the number and percentage of correct answers.

The Star Trek scenario, while interesting to speculate on for its implications in cognition and language, is a bit beyond reach. In contrast, the 2001 scenario is already being realized in very limited ways. For example, computer adaptive testing is highly individualized to each user, but built upon a database developed from experience with a large number of users.

Some Dimensions of CALL

CALL is usually described in terms of the linguistic skill or area it addresses, or the type of activity it offers. Thus, there is CALL for reading, listening and reading, and some recently for speaking; CALL for vocabulary, spelling, typing; CALL in the form of games, simulation, "drill-and-kill," etc. Wyatt (1987, pp. 87-88; cited in Dunkel, 1991, p. 27) offers the following list of activity types:

- Tutorials
- D & P
- Games
- Holistic practice—(high-level contextualized practice—cloze)
- Modeling
- Discovery—situations encouraging inference
- Simulations—experiment with language using simulators
- Adventure readings
- Annotations
- Idea processors

- Word processors
- On-line thesauruses
- Spelling checkers

In Higgins (1995) we find the delightful set of functional descriptions for CALL:

> Do what I tell you.
> Guess what was there.
> Can I help you?
> How do I get out of this?

While useful, these descriptions are qualitative and not along similar dimensions, and they thus make comparison among CALL objects somewhat difficult.

Borrowing basic terms from physical science, I propose a description of CALL within a space of dimensions that can be used to describe any CALL object. By a dimension I mean a continuum that can be labeled and calibrated with a rough scale extending from less to more. A space is a collection of such dimensions, likely many more than the three or four we commonly think of, and it has the property that, broadly speaking, moving a point along one dimension in the space need not change the position along any other dimension. A CALL object can be represented as a point in this space and described and compared with other CALL objects using locations on each dimension. For example, we could say of a word processor that it is high in user input, but low in multimedia and interaction. In contrast, an information kiosk display might be high in multimedia but low in both interaction and user input.

Figure 1 shows a (non-exhaustive) list of dimensions of the CALL space, and the extremes of the continuum of each dimension. The terms used for these dimensions are expanded below. In most cases, a higher value along a dimension suggests a more powerful system, but this need not always be so. For example, a "drill-and-kill" system is for habit-formation and so focuses a very limited range of behaviors.

Information Flow Balance: The relative volume of input from the user and output from the system. In a word processor, the flow is almost entirely from the user; in contrast, a kiosk usually accepts simple push-button inputs and then displays much information.

Sequencing: The degree to which the CALL activity is controlled by the system. Sequencing can be highly non-linear but still controlled, as in the case of hypertext. This dimension describes an attribute related to the issue of the domain of CALL. At the low extreme of sequencing, any language activity using a computer qualifies as CALL or Computer Enhanced Language Learning, while the structured extreme represents so-called "strict" CALL.

Input/output flexibility: The degree that the user and system, respectively, can select from a variety of possibilities. For example, a push-button user-input is fixed, while a free-text input is variable. Similarly, the system can simply beep at an incorrect input, while in contrast, an artificial intelligence system selects from a large repertoire of responses.

User Memory/Cognitive Load: The degree that these are exercised. A game like *Concentration* imposes a high memory load but elicits little

Figure 1: Some dimensions of the CALL space and their values at low and high extremes.

Low	DIMENSION	High
One Way	Information Flow Balance	Interactive
Free	Sequencing	Structured
Fixed	Input Flexibility	Variable
Direct	User Memory Load	Hierarchical
Reaction	User Cognitive Load	Deep Thought
Training	Behavioral Variability	Teaching
Symbolic	Reality Bandwidth	Virtual
Local	Data Access	Global
Fixed	Output Flexibility	Variable
Surface	System Layering	Deep

cognitive activity, while a storyboard evokes considerable cognitive activity at, for example, word, grammar, semantic and text levels.

Behavioral Variability: The specificity of expected user behavior. A typing tutor is almost entirely for training finger and hand habits, while a hypertext-linked text is operating at a conceptual level.

Reality Bandwidth: How close to virtual reality the system approaches. A text-based system is almost entirely symbolic.

Data Access: The extent of the system's database. A storyboard database is usually just the words of the story, while the broadest extreme might be the Internet.

System Layering: The complexity of the system in terms of how much it is doing with the user data. A simple system likely only accumulates totals of correct responses and perhaps tracks the stopping point of a session. More sophisticated systems track multiple user input data sets for statistical analysis and further system refinement.

Figure 2 shows some typical examples of CALL located in the CALL space of Figure 1. A salient feature of Figure 2 is that the word processor seems to be, overall, a rather powerful CALL system, an assessment that corresponds to the intuition that it is very useful in ESOL writing work. This power is, of course, highly dependent on the user and externally imposed task; the word processor itself is not a sequenced system.

Figure 2 also reveals the current state of technical development in CALL along each dimension implied by the examples. In particular, sequencing, and cognitive and memory loads seem to play a larger part, while data access and system layering are conspicuously low. Indeed, most CALL developers tend to select clear and focused tasks, and select contents that are appropriately challenging. Conversely, CALL developers—who tend to be language teachers rather than programmers, are perhaps less inclined to become involved with the sort of technical sophistication required to develop deeply layered systems that access large databases.

Figure 2: Some CALL systems located in the CALL space by their relative position along the dimensions of Figure 1.

DIMENSION	CALL EXAMPLE			
	WP	*K*	*AG*	*SB*
Information Flow Balance	L	L	H	L
Sequencing	L	H	M	L
Input Flexibility	H	L	L	L
User Memory Load	H	L	L	H
User Cognitive Load	H	L	M	H
Behavioral Variability	H	L	L	M
Reality Bandwidth	L	M	H	L
Data Access	L	L	L	L
Output Flexibility	L	L	M	L
System Layering	L	L	L	L

CALL EXAMPLE: WP = Wordprocessor; K = Kiosk; AG = Action Game; SB = Story Board

RELATIVE POSITION: L = Low; M = Medium; H = High

Figure 3: Present, near and far future CALL scenarios located in the CALL space by their relative position along the dimensions of Figure 1.

SCENARIOS DIMENSION	*Now*	*2001*	*Star Trek*
Information Flow Balance	M	H	H
Sequencing	M	H	L
Input Flexibility	L	H	L
User Memory Load	M	H	L
User Cognitive Load	M	H	L
Behavioral Variability	M	H	L
Reality Bandwidth	L	H	L
Data Access	L	H	L
Output Flexibility	L	H	H
System Layering	L	H	H

RELATIVE POSITION: L = Low; M = Medium; H = High

Returning to the general CALL scenarios outlined at the beginning of this paper, their positions in CALL space are shown in Figure 3. As might be expected, the 2001 scenario is a highly flexible system maximized in all dimensions. Combining human and machine strengths, it is the ideal active learning system. The Star

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Trek system is more like a mind modification system—the user is passive and simply receives the new language.

These considerations suggest fruitful lines for CALL development. More attention should be paid to layered systems that can deal with flexible input and output, freely branch within and access a large base of tasks and data, depending upon user inputs, and can collect and process multiple user inputs for ongoing refinement of the system.

A hint of such a system is described in Berberich (1995), in which the notion of Computer Adaptive Testing (CAT) is extended to a teaching system. A CAT system draws upon a large database of test items, or "item bank," calibrated for difficulty using results from large samples of users. During a test, the CAT system continually adjusts the difficulty of items presented to a user based upon the user's immediately past inputs. The test is thus tailored to each user, and usually completed in a very short time.

Extending CAT to teaching involves building a database of language items with a very large number of calibrated drills and exercises for each item. The system first assesses the level and weaknesses of the user, formulates and proceeds with a learning plan based upon results from a large sample of similar users, but can deviate from the plan to branch to other language element work as needed.

The final refinement to such a system would, of course, be natural speech input and output and fairly natural conversational capability. Both of these are in the somewhat more distant future.

Summary

This brief outline of CALL space helps to reveal the scope of CALL by articulating specific and relatively independent dimensions of CALL space. Examples of CALL can be compared and assessed by locating them in this space, and fruitful approaches for future development are clearly revealed. It appears that such approaches will involve systems that process user data on many levels and accumulate data from multiple users for ongoing system refinement. Some limits of CALL are discussed in the form of present, near and far future scenarios, and these scenarios are assessed within the CALL space described.

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